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I.

# THE ETIOLOGY OF LATERAL CURVATURE.*

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According to the most modern and most generally accepted text-books on orthopedic surgery, lateral curvature of the spine is practically always due to weight-bearing under abnormal mechanical conditions. In those forms of lateral curvature, which are known to follow pathological conditions or congenital malformations of the spinal column or are due to disease of the soft parts in its neighborhood, the development of the scoliosis is said not to depend directly upon the pathological conditions, but primarily upon the fact that weight-bearing under these abnormal conditions induces a series of changes in the spine which result in the definite anatomical and clinical phenomena known as scoliosis. This theory is supposed to be borne out by the fact that typical scoliosis may develop in individuals in whom there is no demonstrable disease of the spine or the soft parts. Hence it is assumed that weight-bearing by itself is capable of causing lateral curvature; and it is supposed that all forms of scoliosis which cannot be traced to demonstrable disease in or near the spine are purely mechanical in their origin.

The supposedly mechanical forms of lateral curvature are usually classified according to their supposed etiology into (1) those caused by faulty posture, the habitual lateral curvature, and (2) those due to asymmetry of the pelvic or shoulder girdle, or the extremity, the static lateral curvature. Though it is known that the habitual lateral curves differ from the static or functional forms,

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because the latter are total curves and may be corrected by compensating for the asymmetry, whilst the habitual forms are local, cannot be entirely corrected by change of position and are organized (*i. e.*, the spine becomes stiff in a position which can neither be voluntarily assumed by the individual nor experimentally reproduced in the cadaver), nevertheless, the static curves are considered related to the habitual forms of scoliosis, because it is supposed that a static or functional curve may become transformed into an organic one mechanically. Upon these grounds, though most careful observers are willing to admit there is a certain percentage of cases of scoliosis which cannot be explained upon a purely mechanical basis, the majority of writers, even those who are willing to admit of exceptions, believe lateral curvature to be a purely mechanical condition.

Orthopedic literature abounds in more or less ingenious theories to explain the genesis of lateral curvature upon mechanical or, as some would have it, upon purely mathematical principles. However, though some of these theories perhaps explain how the bones accommodate themselves in time, to a new and permanent position, none of them elucidate the cause of lateral curvature. On the other hand, there are a number of correlated facts which taken together must, I think, lead one to believe that mechanical conditions, if they play a part at all, are merely of secondary importance as far as organic lateral curvature is concerned. It is my purpose to briefly call attention to these facts in this preliminary paper, and to suggest what I think a more plausible explanation of the cause of the so-called habitual or, as they were formerly called, idiopathic lateral curvatures.

For the present I leave the forms of spinal deviation which are traceable to known disease of the spine or anomalies of the soft parts out of the discussion.

In habitual scoliosis a continual abnormal posture—faulty position at the desk, carrying heavy loads, and the like—are supposed to cause a shifting of the weight-bearing upon the spine from its normal plane. Under these circumstances, the bones of the young, being plastic, accommodate themselves, and in time correspond anatomically to the abnormal posture, and

finally the faulty posture becomes the only one possible. The anatomical changes in the spine are represented as phenomena of adaptation. The genesis of the deviation, if this explanation is correct, is purely mechanical.

If it is mechanical it must of course conform to the principles of mechanics. But one of the cardinal principles of mechanics (a mathematical science) is that exactly similar conditions will produce exactly similar results. In the very beginning of a discussion of lateral curvature we are confronted by an incontrovertible fact which makes the mechanical explanation of lateral curvature doubtful, viz., the variability of the result under constant mechanical conditions.

Years ago the fact, that only a small percentage of children under similar mechanical conditions developed lateral curvature, was used as an argument against the mechanical explanation of the lateral curvature; and up to the present time no one has been able to give a satisfactory explanation for the supposed selective action of purely mechanical conditions. Moreover, it is a well-known fact that children who constantly assume an abnormal attitude may have spinal deviations which correspond to the posture, but these children may never develop an organic curve; and the purely postural or functional curve may disappear without treatment. Were the condition a purely mechanical one, we should expect to have the deviation whenever the same mechanical conditions were active. Moreover, it would not be unreasonable to expect that under the same mechanical conditions, not only a deviation, but an exactly similar deviation should follow exactly similar mechanical conditions. Not only does organic lateral curvature not invariably follow abnormal mechanical conditions of the spine, but even when organic lateral curvature is present coincidentally with abnormal weight-bearing, the spine, far from corresponding to the abnormal posture, in every case, is often curved in the opposite direction. Right-handed children have left curves and *vice versa.* In some the curve is dorsal, in others lumbar; in some it is so high up in the cervical region that weight, bearing can with difficulty be made to explain its appearance and rapid development. Such an extreme variation of the result

under constant mechanical conditions is absolutely opposed to mechanical principles.

Even should we, for the sake of argument, admit that a certain abnormal posture constantly maintained by a growing child will ultimately become fixed, we are still a long way from explaining the mechanical genesis of organic lateral curvature. For, as Lovett aptly states, aside from their etiology lateral curves of the spine are of two distinct types: (1) curves which correspond to a posture which can be voluntarily assumed by the individual, functional curves, and (2) those which cannot be assumed voluntarily nor be reproduced experimentally in the cadaver—organic lateral curvature. As the so-called habitual curves are of the latter class, in order to show that these curves are mechanical in their origin, it must first be explained how, mechanically, an individual assumed a position he is unable to assume or indeed which cannot be reproduced in the spine experimentally. This is, of course, impossible of explanation.

The usual method of explanation is one of evasion. It is assumed that originally all the cases are postural and in those predisposed the organic curve is gradually evolved from the functional. Manifestly this brings us no nearer an understanding of the question because it still remains unexplained how the individual assumed a position which it is impossible for him to have assumed. Wolff's law, which is generally introduced into the gap at this point certainly does nothing to elucidate the subject. The law, if it has any bearing upon deformity at all, is absolutely incapable of explaining the cause; it may be a means of explaining how the structure of bone varies to adapt itself to new and fixed positions, but it gives absolutely no clue as to the cause of change from one position to another. On the contrary, were Wolff's law operative in the genesis of lateral curvature, it is difficult to see why the vertebra should not adapt themselves to the postural or functional curve and that this should, in the course of time become permanent and organized. But this is not the case. Functional curves never become organized. They may exist for many years without the advent of organic change in the spine. This is well illustrated in the cases of spinal curvature (functional)

due to short leg. In these, a short leg which is congenital or has existed for years, causes nothing more than a total curve and the spine remains perfectly mobile. Moreover, when, as occasionally happens, an organic curve develops in an individual who has previously had a postural or static curve, the organic curve not only does not invariably correspond to the functional curve, but may be in the opposite direction. Thus a left dorsal organic curve may appear in an individual who previously had a right total curve and *vice versa*. Lovett supposes that these so-called transitional cases are produced in an effort on the part of the individual to right the spine. But leaving aside the impossibility on the part of the individual to reproduce an organic curve mechanically, either voluntarily or involuntarily, knowing as we do how difficult it is to induce children with an inclination to stoop to hold themselves erect, it seems more than improbable that a child should so persistently endeavor to overcome a faulty posture that he finally produces a localized bend in the spine in the opposite direction.

The arguments against the tenability of the theory of the mechanical genesis of organic or structural lateral curvature could be multiplied many times. But I think those already advanced are sufficiently clear to show that the weight-bearing or mechanical conditions of any kind are either of secondary importance or have absolutely no bearing upon the development of structural or organic lateral curvature. Neither in the so-called habitual or idiopathic or in those forms due to known disease of the spine is weight-bearing primarily responsible for the deformity. The mere fact that organic lateral curvature may occur in quadrupeds in whom the spine does no weight bearing at all is sufficient to make this clear.

What, then, if it is not mechanical, is the cause of organic or structural lateral curvature? In the forms due to known disease of the spine, rachitis or osteomalacia or other organic disease of the vertebræ, the softening of the bone which is a prominent feature of all these conditions is sufficient to account for the bending of the vertebræ and, as a result, the deviation of the spine. If, as seems to me perfectly natural, we consider the bend in the spine to cor-

respond to the location and extent of the disease the difficulty in accounting for the variations in the location and the character of the deformity immediately disappears. It should be remembered that rachitis and osteomalacia, though general conditions, do not always cause general and uniform changes in the bones. Only some or even only parts of some of the bones may be affected, and thus innumerable varieties and combinations of deformities may be present in these conditions.

In those forms of lateral curvature due to conditions which hold the spine in an abnormal position—empyema, infantile paralysis, etc.—weight-bearing evidently can play no part at all. The spine is held firmly in an abnormal position and growth and development are influenced by the fixed position of the spine. This form of deviation differs radically from the deviations due to asymmetry outside of the spine; for in them the spine retains its mobility and growth is not interfered with and, as has been stated, there are no structural changes in the bones. But these forms eliminated, there still remain the large number of structural or organic spinal curvatures the etiology of which has been unexplained. These are the so-called habitual scolioses. Even those who hold most tenaciously to the weight-bearing theory admit that weight-bearing of itself is insufficient to account for the more or less definite onset, development and course of this form of lateral curvature. A certain abnormal plasticity of the spine is spoken of as an additional factor.

My study of the subject has led me to believe that these form of lateral curvature are due to a distinct pathological change in the spine itself. The results of the study can only be very briefly related here.

In the first place, as the so-called habitual scolioses are all structural curves which cannot be reproduced mechanically either in the living or the dead subject, it is not only reasonable to suppose that they are primarily caused by a structural change in the bodies of the vertebræ, but there is no other way in which their occurrence can be explained. The fact that such curves may appear in individuals with postural or other functional curves and in these cases the organic curve bears no relation to or is in an opposite

direction to the functional curve is indicative, firstly, that these organic curves must be independent of mechanical conditions and, secondly, that their fundamental cause must be a pathological change in the vertebra themselves. A further indication that these organic curves are due to a pathological condition and not to mechanical abnormalities is the fact that the curve increases for a definite though variable length of time irrespective of mechanical conditions or treatment. When once the disease has run its course, which may be comparatively short, the deformity is permanent; it does not increase nor does it improve by improvement of the mechanical conditions. The curve is of such a nature that no mechanical condition can reproduce it. Only when the bones are softened and bent or are partly destroyed by some pathological process can a bend of this character be produced. Hence the genesis of the organic curves of unknown etiology must be analogous to the genesis of the curves due to known pathological processes. Clinically, this is borne out by the fact that the so-called habitual scolioses exactly resemble the curves of rachitis and osteomalacia in their fundamental characters. The latter similarly increase during the active stage of the disease, the location depends upon the site, and the extent of curve upon the extent and severity of the disease. When the disease has once subsided the curve is permanent, *i. e.*, simply a deformity following the disease. There are, furthermore, certain clinical phenomena concomitant with the advent of the so-called habitual organic curves which strongly suggest that the condition is due to a definite pathological process.

These deviations of the spine come on at a definite period of life, viz., puberty.

The following table shows the ages of 500 consecutive cases of scolioses seen at the Hospital for Ruptured and Crippled:

| Ages | 2. | 3, | 4, | 5, | 6, | 7, | 8, | 9, | 10, | 11, | 12, | 13, | 14, | 15, | 16, | 17, | 18, | 19, | 20, | over 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. cases | 2, | 4, | 3, | 1, | 3, | 9, | 10, | 12, | 19, | 22, | 48, | 58, | 72, | 51, | 46, | 29, | 21, | 14, | 6, | 27 |

| | |
|---|---|
| Under 12 years | 85 |
| Between 12 and 18 years | 362 |
| Between 18 and 21 years | 26 |
| Over 21 years | 27 |

The remarkably sudden increase of deviations of the spine at the age of puberty and the equally sudden decline in their number from that age is manifest. The influence of puberty as a cause of so-called idiopathic organic lateral curvature becomes still more apparent when the cases of lateral curvature due to known causes other than this are eliminated.

Thus of the 85 cases which are under 12 years:

| | |
|---|---|
| Congenital malformations | 6 |
| Rachitis | 7 |
| Cardiac | 2 |
| Meningitis | 1 |
| Poliomyelitis ant | 7 |
| Static | 9 |
| | 32 |

Leaving 53 due to unknown causes.

Of the patients over 18 years

| | |
|---|---|
| Conditions began at puberty in | 20 |
| Due to poliomyelitis | 1 |
| Static | 1 |
| | 22 |

Leaves 31 not accounted for.

Thus, of the 500 cases of scoliosis, 382 began at puberty, ten were functional cases, twenty-four were due to known organic disease and in eighty-four which began before or after puberty, the cause or time of onset was not given. If we leave out of consideration the functional cases and those due to known organic disease we have left 466 of so-called idiopathic or habitual scoliosis, of which 382 began at puberty = 81.9 per cent. If the notes were carefully kept this percentage would be greatly increased, for careful inquiry or examination nearly always reveals the cause in children below twelve.

Thus in the cases of my own, hospital and private, of which careful notes were kept the influence of puberty is still more manifest.

Under twelve:

| | |
|---|---|
| Congenital | 2 |
| Rachitic | 16 |
| Cardiac | 1 |
| Pulmonary | 1 |
| Static | 4 |
| Between 12 and 18 years | 190 |
| Over 18 years | 22 |
| | 236 |

Of the 190 cases between twelve and eighteen years, 120 were between twelve and sixteen years; of these

| | | |
|---|---|---|
| Between 12 and 14, | 70 | Recent and slight. |
| Between 14 and 16, | 28 | Recent and slight. |
| Between 14 and 16, | 22 | Marked and existing 1 to 3 years. |
| | 120 | |

Cases between 16 and 18:

| | |
|---|---|
| Recent and mild | 53 |
| Marked and existing 1 to 5 years | 17 |
| | 70 |

Cases over 18 years:

| | |
|---|---|
| Marked and came on at puberty | 12 |
| Slight onset undetermined | 7 |
| Static | 2 |
| Poliomyelitis | 1 |
| | 22 |

Thus, of the 236 cases all but seven were due to known causes or could be definitely traced to the advent of puberty. Of the twenty-four cases which were observed before puberty, all could be ascribed to definite causes. Of the twenty-two cases over eighteen years, twelve came on at puberty. If we add these twelve to the 190 seen at this age we have

| | | |
|---|---|---|
| Onset at puberty | 202 | 856 per cent. |
| Due to known organic disease | 21 | 089 per cent. |
| Functional cause | 6 | 025 per cent. |
| Lause unknown | 7 | 029 per cent. |

Leaving out of consideration the functional cases and those due to known organic disease in or near the spine, we have 209 cases of iodopathic scoliosis. Of these 202, or 96 per cent., came on at puberty. Thus allowing for all discrepancies, unreliable his-

tories, etc., the percentage of cases of the so-called idiopathic or habitual scoliosis which appear at puberty is so enormous that it is quite impossible to overlook the relationship.

Besides the local condition in the spine, these children present certain general symptoms, which are known to be associated with pubescence.

The general symptoms suggest that an abnormality which interferes with the nutrition generally and with the nutrition of the bones of the spine locally, is the cause of the condition. The symptoms are enervation, disturbance of the functions of the nervous system (so-called nervousness), secondary anemia, loss of flesh or the contrary obesity, disturbance of the appetite and various other disturbances of the mental and physical equilibrium. In girls the condition so consistently immediately precedes or follows the appearance of the first menstruation that a connection between the condition and the completion of the development of the generative organs is strongly suggested. The more so as bone softening and allied vegetative conditions seem to be most readily induced at times when the functions of the generative organs are most active or about to cease; *i. e.*, pregnancy, the menopause, etc. So the osteomalacic conditions which are prone to occur during pregnancy and the improvement in certain cases of osteomalacia after ovariotomy. Moreover, after the generative organs have reached their complete development the so-called habitual curves cease to appear. So habitual lateral curvature, so-called, never comes on after the twentieth year and is very rare after the eighteenth.

In boys the condition comes on at puberty just as it does in girls. That the condition is less common in them is not at all surprising, because the development of the generative organs does not seem to entail such great anatomical and physiological changes, or react so intensely upon the general physiological processes in males as it does in females.

As lateral curvature is not a fatal condition, it is, for the present, at any rate, impossible to demonstrate early anatomical lesions. But it seems to me, from the general evidence at our disposal, we must be led to the following deductions:

There is a distinct form of lateral deviation which appears at puberty. This deviation must be due to primary changes in the vertebræ because it is impossible, with the vertebræ unchanged, to reproduce such a bend in the living or the dead subject.

Though it is impossible to demonstrate the connection absolutely, all the evidence at our disposal points to the strain of the development of the generative organs as the cause of the pathological change in the bones. This change in the bones is not an inflammatory condition, as maintained by Lorinser many years ago, but most likely analogous to the changes in the bones induced by other vegetative disturbances such as rachitis and osteomalacia

With these facts in mind, the indications for treatment are so plain that only a few words are necessary.

Certain children seem to have insufficient natural resources to supply the energy necessary for the complete development of the generative organs and at the same time maintain the general nutrition within normal limits under the usual conditions. Hence, unless these children are placed under advantageous conditions, the nutrition suffers. When, as is usually the case, such children are spending the best hours of the day in a more or less unsanitary school-room where mental development is forced, the nutrition generally must suffer and they acquire lateral deviations of the spine or analogous abnormalities. They acquire scoliosis not because they assume faulty postures in the school room, but because they are in school at all and overstrained mentally and physically.

The indications therefore lie in the line of prophylaxis. Children at puberty who show signs of deficient nutrition should be out of school in the fresh air and given every opportunity for the improvement of the nutrition, whether they have lateral curvature of the spine or not. Under such circumstances, exercises may, by improving the general physical condition, be of benefit. As they are given at present when the children are already overtaxed from the day's exertions in school, they are, as every one who has much experience must admit, more likely to increase than diminish the tendencies to deviation or to aggravate the condition when it already exists.

If what has been said in the foregoing pages is correct, it is evident that the name habitual lateral curvature is misleading. It is therefore suggested that the form of lateral curvature, so-called, be named pubescent lateral curvature, a name which expresses somewhat the etiology and clinical condition. It seems to me, if we adopt the pathological classification suggested by Lovett as a secondary one, for the fundamental classification of lateral curvature, it might lead to a better understanding of the subject.

Thus, lateral curvature is of two distinct kinds:

| *Functional.* | | *Organic.* |
|---|---|---|
| Static abnormalities. | Primary | Congenital lat. curv. |
| Asymmetry outside of spine | | Rachitic lat. curv. |
| | | Osteomalic lat. curv. |
| | | Pubescent lat. curv |
| | Secondary | Empyema |
| | | Infantile paralysis. |
| | | Tumors, etc. |

## II.

# SUGGESTIONS FOR THE TREATMENT OF LATERAL CURVATURE BY BRACES.*

### A REPORT BASED UPON THE MECHANICAL DERIVATION.

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True lateral curvature is at the present time not to be classed as a curable affection. Although certain cases of "habitual" curvature have been cured, such cases have not presented actual deformities in the bones. Any improvement depending upon the obliteration of such deformities has not yet been achieved. What is the reason that this affection has so stubbornly resisted our efforts? Is it because we are trying to do the impossible or is it simply because we do not know what to do? The answer must depend upon future results.

The only way that any advance in a subject of this kind is possible is to try new methods. But, before trying new methods, there must be some preconceived idea, some reasonable hypothesis on which to base the attempt. It was with this in mind that we previously ventured upon an explanation of lateral curvature, hoping to be able to plan a rational system of treatment. In that explanation we offered nothing as proved, all our deductions being hypothetical only. The limitations of such a method are plain, but the plea is that no other is possible.

In gathering the evidence, we considered most of the important views of the past and selected from them the ideas which seemed most pregnant, then with the help of certain significant points in the anatomy and such slight experience as we happen to have had, we devoted ourselves to the evolvement of what seemed a reasonable theory. We only dealt with proximate causes, as-

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suming that there were remote causes at the start and which had no further influence than to render the proximate causes active.

To illustrate this, let us picture a can of gunpowder which is to be exploded. The explosion may be brought about in at least two ways—namely, by a fuse lit by a match or by percussion from a direct blow. These two ways are, of course, of an entirely different nature, but whether the can be exploded by one method or the other, the effect of the explosion—namely, its bursting with a loud report—is just the same. In the analogy the effect of the explosion corresponds to the final distortion effects which we see in lateral curvature, being typical for the great majority of advanced cases, while the igniting agency, whether a match or a percussion hammer, corresponds to the remote cause.

This analogy will be disputed on the grounds that the causes of the explosion are in reality just the same for the two cases; for whether it be by a fuse or by direct percussion, the invariable antecedent of the explosion in every case must be a rise of temperature conducing a chemical change, so that there is a sudden and violent expansion of gases due to the conversion of the powder. The causes of the explosion, therefore, are those factors—namely, the raise of temperature and the chemical change. This disputation is precisely true. Not only is the effect of the explosion the same in the two cases, but we must have identical antecedent factors in order that the explosion may take place. Therefore, we willingly admit that these phenomena, the rise of temperature and the chemical change, are true causes necessitating the explosion, they being the invariable antecedents without which the effect could not take place. But this is the very point which makes our analogy pertinent, because in the "Mechanics of Lateral Curvature" it was just such causes that we tried to isolate; for we tried to show that there are certain intermediate links between the remote agencies and the final effects which are the invariable antecedents to those effects, and those invariable antecedents were classed as proximate causes or the mechanics.

In dealing with the subject in this fashion we had to look in the unchanged body, or the normal, for the inherent forces capable

of being exploded. We had to discover tendencies present in every human being which are only waiting to be let loose by the remote agencies. This, then, was our first advance, and seizing the fundamental clue from Dr. Lovett's work we were able to identify in postural strains as seen in the normal the very forces which seemed significant as being capable of bringing about the pathological effects; and so the rationale of dividing the cause from the mechanics seemed justified by the inferences which we were able to make from normal tendencies alone.

But that there is a mechanics of lateral curvature is also suggested in the developed anatomical specimens. The reason for this is that the ultimate effects in the different cases are so typical. We refer to these scoliosis cases as typical, not so much because they resemble one another in their individual distortions, although that in itself is significant, but rather because of the peculiar and constant combinations in which the individual distortions occur together. For example, we find that the dorsal curve of the column is practically always on the side of the greater posterior rib prominence. Again, we find that the bodies of the dorsal vertebræ always point to the side of the convexity of the curve, and so we find other combinations which are characteristic. The occurrence of these combinations seems to indicate that once deformation has begun, the various distortions will succeed each other according to certain definite tendencies and through a prescribed path; for if different remote causes produced lateral curvature, each by its own peculiar formula of mechanics, there would probably be almost as many types of scoliosis as there are different remote causes. So we may state that such evidence in the developed cases together with the inferences made by studying the normal, both indicate a true mechanics for lateral curvature.

There is a third group of evidence not only suggesting that there is a mechanics, but, in a way, indicating the nature of the mechanics, and that evidence is derived from observations upon the living scoliotic. The essential point here referred to is that many of these scoliotics may be reduced back into a position of pure deformation, which position seems to reveal a picture of the

vicious forces which have produced the deformation changes. These vicious forces correspond to the very forces which are identified in normal postural strains as tending to distortion. In this way we obtained clinical confirmation of what seemed to be a logical deduction from the normal.

When we come to the question of the treatment, we can readily see the great advantage gained by dividing the cause from the mechanics, for by such a separation it is possible to devote our therapeutic efforts to the mechanical antecedents directly, without concerning ourselves with the nature or the name of the remote cause; and this will seem the more satisfactory, because it is well known that the cause once active may cease, giving us nothing pregnable to attack in that direction. Referring, for example, to scoliosis due to infantile paralysis. The original condition was the inflammatory state of the cord in the neighborhood of certain vessels, but that condition in the cord is now a past factor, because the paralysis has occurred, and even if we could restore the cord and rehabilitate the paralyzed muscles, the effect of the mechanical changes in the skeleton would undoubtedly still persist, and so it is with that effect that we must deal.

But if we separate the cause from the mechanics, we must, on the other hand, not lose sight of the great value of having a precise knowledge of the manner in which the mechanical changes succeed each other, because the sequence of the phenomena may serve as a guide in showing us how to restore the body to its original shape. Let us therefore review our earlier findings:

*The Mechanics of Lateral Curvature.*

The important point is that the deforming tendencies are revealed in postures of asymmetry, namely, in lateral bend or twist or in the combined states. Following these attitudes there took place, according to our conclusions, a great strain in the peripheral skeleton with the reactionary strain (which may or may not be considered primary) in the central skeleton or column. The chief effect noted was that with the diversion of the trunk and the accompanying strain in the peripheral parts, the ribs had to give if the limits of elasticity were overstepped. This strain not only deformed the ribs, but caused a retrogression of the ver-

tebræ to which they are attached. The thorax having become deformed after this fashion, there had to be a new balancing of parts around the line of support on account of the difference in weight on the two sides of the thorax; consequently, the vertebræ would be drawn out of their normal line and rendered into a lateral curve, although even before this took place the central primary strain in the column in the deformation attitude might in itself make a permanent curve in that column. These were the chief practical points of the theory. One significant point about these postural strains was that although the formula of change for lateral bend and for twist was somewhat different, the effect was, nevertheless, the same; and this from the point of view of treatment is of considerable importance, as will be seen.

(It may be worth while to remind the reader that such postural stresses as we have dealt with do not necessarily represent the actual stresses leading to lateral curvature. They should simply indicate the relation of forces to resistances and should serve as formulative only. According to our explanation, lateral curvature might develop without an apparent change in posture because we may assume that the strains in those cases are just the same as though an actual change in posture had taken place. Thus, it is easy to conceive a diminished resistance in the skeleton which reacts with just the same bone deformation as increased stresses in the soft parts. It is a question of equilibration of matter to force, pure and simple.)

*The Position of Pure Deformation.*

As already suggested, there is clinical evidence seeming to confirm the theory above stated. This evidence is offered in the position of pure deformation. This position (fourth paper on the "Mechanics") is one to which almost all scoliotics may be reduced and is obtained by experimentally posing the patient until an attitude is found in which he resembles the normal most strikingly. In this attitude we may note as isolated the representation of the effect of deformation stresses, manifested chiefly by the misshapen thorax and the peculiar adjustment of contours. As the whole series of mechanical changes can be roughly estimated by this means in the living, our treatment may be based on

conditions thus pictured, and the details of the mechanical changes will require no further attention if the principles are mastered.

*Indications for Treatment.*

What, then, are the chief indications suggested by the mechanics for the practical purposes of treatment? Let us compare a case of scoliosis with one of club-foot. If an observer will note how a club-footed individual treads upon the outside of his foot, he may be certain that every step that the individual takes implies a strain tending to make the foot worse. The principal object of treatment, then, will be to place the foot in a position opposed to that of such deformation, so that every step that the corrected foot will take will tend to make the foot better rather than worse. When, therefore, the foot has been placed in such a position that only correcting strains can occur, then the simplest and most logical indication for treatment has been applied.

In scoliosis, our aim must be to do practically the same thing. We must note first of all what the deforming strains are. We must attempt to correct them, and must finally arrange the body so that its functions imply strains in a correcting sense. If we can do this—namely, place a patient in a position in which he calls forth forces inherent in the body which themselves tend to correct—then we take advantage of the chief indications for treatment as suggested in the mechanics. It is just here that we grasp the full force of recognizing the position of pure deformation, because that position reveals a picture of the patient in an attitude of vicious strain carried to its extreme.

But even if the position of pure deformation reveals the nature of the mechanical changes, it nevertheless offers one difficulty, because we cannot always say from the distortions so read whether the strains of lateral bend or twist were most active, as the final effect is so similar. However, it will be convenient to assume that all cases are derived from lateral bend because, if the final effect from either set of strains is the same, then opposing strains for purposes of correction will be just as valid against one as against the other. The important point is to distinguish between the rights and lefts. So we must reduce the patient into a

position of pure deformation indicating the general direction toward which the original strain took place. In cases where this is not plain, that side of the thorax presenting the greater rib deformity will indicate whether the strains correspond to a bend to the left or to the right. Having noted that position and the general direction of the vicious strains, our aim must be, as above stated, to bring about the opposing stresses.

*Indications for a Brace.*

The first task, then, in the treatment should be to divert the posture, and this diversion of posture must be in a direction of lateral bend opposite to the lateral bend determined as above; therefore, as that lateral bend can only be to the right or to the left, the problem amounts to diverting the posture either to the right or to the left. Such a diversion of posture may, of course, suggest a number of plans, but the first suggestion is an artificial resistance, externally applied, inhibiting the patient's tendencies to further vicious strain and promoting new and opposite strains. So the immediate indication is a brace. How may a brace carry out such diversion?

*The Requirements of the Brace.*

Let us take a case of scoliosis with a single total curve, let us say, convex to the left, then the position of pure deformation is a bend to the right. So our instrument must be constructed so as to bend the patient to the left. As in deformities of the lower limbs, we take a lateral upright, apply it to the side of the body and fasten the body to it, giving, if we wish, as much of a correcting curve as seems necessary for the individual case. That is all.

Let us next take a case of scoliosis with a compound curve in the column. We need not be confused. We render the compound curve into a simple curve by reducing the patient into a position of pure deformation, and having noted the direction of the lateral bend, we make our correction in the opposite direction. Thus, for example, in a right dorsal, left lumbar curve, we find the position of pure deformation to be a bend to the left and, whether or not there is a twist present, the curve can always be reduced back into a single total curve. In such a case, again, the aim is simply to divert the patient to the opposite direction namely, to

the right. Even if it is assumed that certain cases are derived from pure twist the argument earlier set forth will simplify the problem and requires no further comment.

In these two examples, we have attempted to divert the posture with respect to the deformation curve in the column, but in either case we must remember that we are not dealing with the column alone, but with the unified trunk which is a large part of the whole body, and in trying to picture the most graphical deformation attitude of a given case we must bear the peripheral

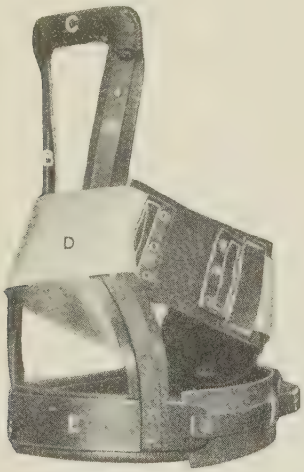



FIG. 1.—Picture of brace: *A*, anterior upright; *B*, posterior upright; *C*, cross-piece; *D*, webbing belt; *E*, pelvic band.

FIG. 2.—Same brace from behind.

contours in mind as well as the line of the spinous processes. If we can reveal the compression of the lateral wall of the thorax as due apparently to the strain in the overlying strata, we get what seems to us the purest picture of vicious posture.

*Description of Brace.*

The brace used (Figs. 1 and 2) consists of a pelvic band to which is fastened a pair of uprights connected above by a padded cross-piece (not supporting armpit). The lower parts of the uprights are curved around the side of the pelvis. Around the uprights and long enough to go around the patient's waist is a

canvas belt which can be laced. The pelvic band may be fastened together either by a buckle or by lacing. The uprights may or may not be padded. Fig. 3 illustrates a similar brace made somewhat lighter. Instead of letting the belt pass around the uprights, I have in recent cases, used a divided belt, the anterior part of the belt being stitched to the anterior upright and the posterior part to the posterior upright (Fig. 4). Figs. 5 and 6 show how the brace is applied on a patient (right dorsal, left lumbar curve).

FIG. 3.—Similar brace somewhat lighter.

FIG. 4.—Brace used by author more recently. Here a divided belt is used. Attention is also called to the leather reinforcement *A* in the belt which is simply used to prevent the belt from wrinkling.

*The Mechanism of the Brace.*

The object of the brace being to divert the posture, the lateral upright must be so constructed that this may be possible. Figs. 7, 8, 9 and 10 illustrate the mechanism. Fig. 7 shows the outlines of the patient erect; Fig. 8, the outlines of the patient diverted into a position of pure deformation, the arrow indicating the direction. In order to bend the trunk in the opposite direction the uprights must be bent as represented in Fig. 9, and this having been done the actual diversion is brought about by the waist belt (Fig. 10) which pulls the lower part of the chest into the hollow of the up-

rights and between them. The arrow in Fig. 10 indicates the direction of the diversion which is just opposite to the one in Fig. 8.

*The Fitting of the Brace.*

In fitting the brace we make paper patterns of the two lateral uprights as we judge them to be most efficient, using stiff cardboard. These patterns together with the measurement for the pelvic band are given to the mechanic who copies the paper patterns in steel and rivets on the pelvic band, selecting stock

FIG. 5.—Brace shown in Fig. 4, from the front applied, to patient.

FIG. 6.—Same seen from the side.

according to the weight and age of the patient (Fig. 11). The surgeon now adjusts the pelvic band and accurately bends the uprights to suit the requirements of the individual case. Then the brace is sent back to be finished and the waist band is applied. The usual weight of the brace when finished for a girl from fifteen to twenty years is one and one-half pounds.

*Cases where the Prominent Hip is the Striking Deformity.*

We have stated that the object of the brace is to divert the

FIG. 7.—Outlines of a scoliotic

FIG. 8.—Outlines of same in a position of pure deformation. Note the direction of bend as indicated by the arrow.

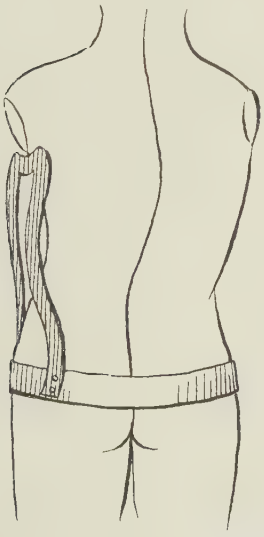


FIG. 9.—Same patient erect and with brace applied, but without belt.

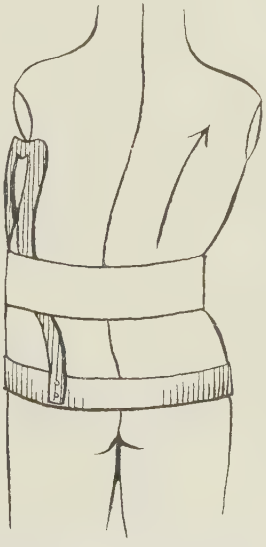


FIG. 10.—Same as Fig. 9, but with belt applied and drawn tight. This illustrates how the lower part of the thorax is pulled into the concavity of the brace, in this way diverting the posture just opposite to the position of pure deformation, as indicated by the arrow.

posture, so we have placed the upright on the side opposite to the convexity of the lateral curve as expressed in pure deformation. There is, however, one exception to this rule, namely, when the chief deformity is the prominence of one hip. In such a case we take into consideration the hip more than the column and correct the posture in accordance with that. Our reason is that the prominence of the hip is due to faulty recovery from deformation; so the brace in this case should deal with the recovery rather than the deformation, and our aim must be to work upon the final balance of the case. So in such a case it is well to put the upright

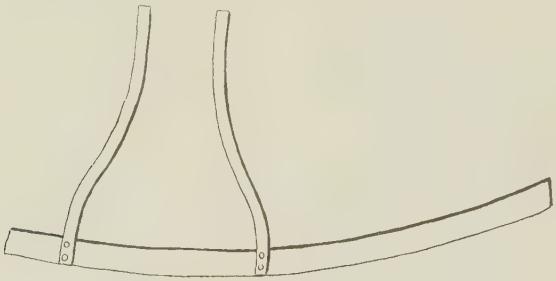


FIG. 11.—Illustrates the steels ready to be fitted.

on the same side as the prominent hip so that the belt will draw the lower part of the thorax into the empty space left between the upright and the hollow waist. Case I, Figs. 12 and 13, is one in which the brace was thus placed. Of course, the ideal condition for treatment is when the upright may counteract both the pure deformation and the faulty recovery.

There is another point which requires attention. If the object of the brace is to produce a new deformation, we must give the patient occasional intervals of recovery, and it is wise after the brace has been worn for a few months to give the patient a chance to come back into the natural erect attitude. Such an interval of relaxation from the brace gives certain muscles which are weak a good chance to strengthen, and the record of the improvement ought to be made not immediately after taking off the brace, but some weeks later. Of course, this is not always practical.

FIG. 12.—CASE I. Before treatment.

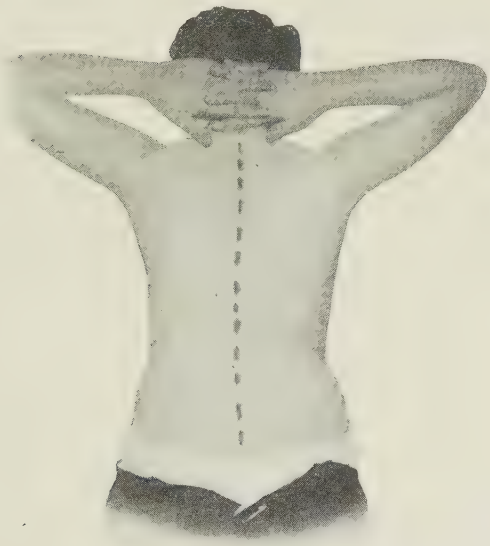
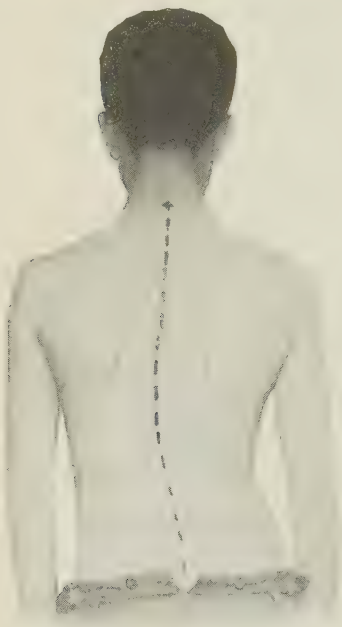


FIG 13 —CASE I. Condition when last seen. The uprights here were applied on the side of the prominent hip. (See text.)

*Some Results:*

The brace has been applied in modified form to twenty of the author's cases, beginning about two years ago. The results are measured by photographs which are all taken in the same way — the patient being at a definite place from the camera, the spinous processes being marked by the same person and the surface shadows being identical for all the pictures. This control of light is brought about by using flashlights, the flashlights always



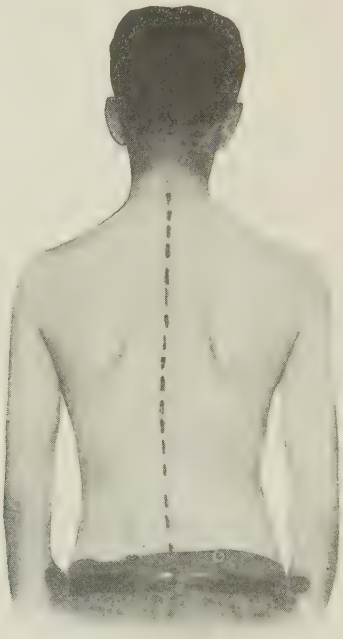
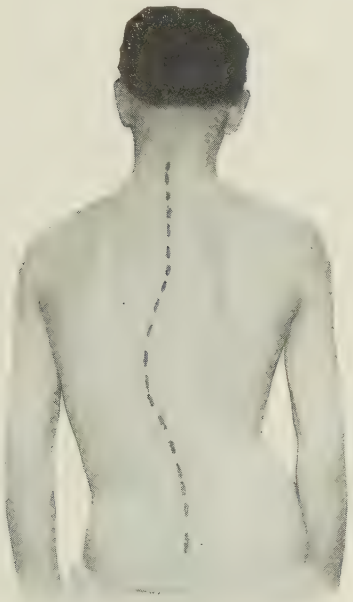


FIG. 14.—CASE II. Before treatment. FIG. 15.—CASE II. Condition when last seen.

being set at a certain point. By this method there is no possibility of deluding the recorder on account of erroneous and distorting shadows. Of the twenty cases, two have been lost track of. Another case only wore her brace for a short time. Of the remaining seventeen cases, three were very light postural ones and, although cured by the brace, could not reflect any special credit on

it, as they were so simple. This leaves fourteen cases which are being watched and who are wearing the brace. Of these fourteen, two are adults on whom the brace was applied for symptomatic reasons and are not recorded. Of the remaining twelve, one showed no improvement in the course of a year and five are under treatment for too short a time to deserve judgment. The other six all showed improvement. Of these six, two (Cases I



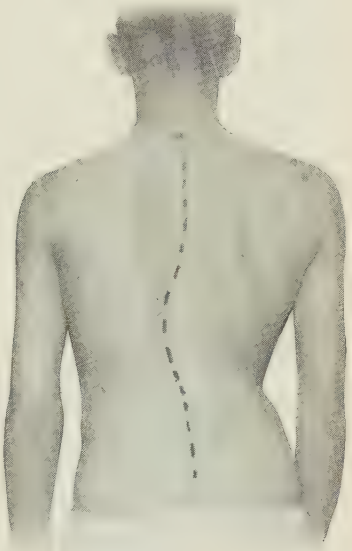


FIG. 16.—CASE III. Before treatment. FIG. 17.—CASE III. Condition when last seen.

and II) are practically cured, but it is doubtful whether these two had structural changes before treatment. The other four, Cases III to VI, were all structural, and although distinctly better, the actual improvement in the skeleton, if any at all, is doubtful. The figures (Figs. 12 to 23) illustrates what the improvement has been.

In closing, it should be stated that the ideas expressed above

FIG. 18.—CASE IV. Before treatment.

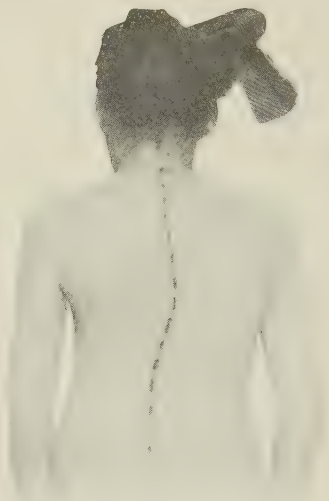


FIG. 19.—CASE IV. Condition when last seen.

FIG. 20.—CASE V. Before treatment.

FIG. 21.—CASE V. Condition when last seen.

are only given in the spirit of suggestion. Although the results are not startling, they are certainly promising. As to the brace described, if it does not cure, it at least carries out the aim for which it is designed. It is true that older braces with pressure pads and other mechanical contrivances might have some effect on the deformity if they really carried out the purpose for which

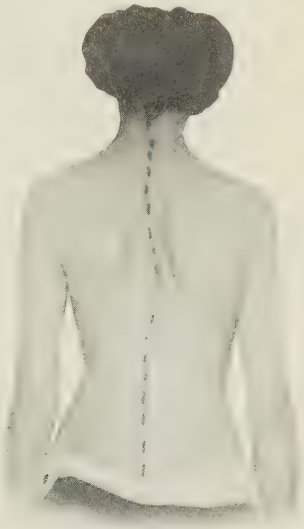


FIG. 22.—CASE VI. Before treatment. FIG 23.—CASE VI. Condition when last seen.

they are designed, but few of them do, and with most of these the patient simply carries around extra weight which has almost no corrective effect. The brace described above does, however, carry out one thing: it does divert the posture and it does it so that every ounce of weight has a definite use. But whether it can cure those cases where an actual change in bone has taken place is at present only a matter for conjecture.

## III.

# ACETONE: ITS OCCURRENCE IN ORTHOPEDIC AND SURGICAL CASES.*

BY JAMES WARREN SEVER, M. D., BOSTON, MASS.

### Introduction.

The presence of acetone in the urine of about 90 percent of the cases operated upon at the Children's Hospital, unaccompanied, in the large majority of cases, by any severe clinical symptoms, and apparently delaying in no way the usual course of the convalescence, has prompted me to study these cases, from their clinical and chemical aspects, with a hope of arriving at some definite facts in regard to its true significance.

In order to get a starting-point, I found it necessary to review carefully the literature of clinical and experimental work done in the last fifty years, as well as the chemical, that I might obtain facts and foundations on which to work in carrying out my present investigations. Therefore, I will give a brief résumé of the literature first, followed by a synopsis of the chemical theories of acid intoxication.

### Literature.

In the last fifty years much has been written in regard to the presence of acetone in the urine and its significance, with reports of many laboratory experiments and clinical cases before and after operation from chloroform and ether anesthesia.

In 1857 Petters first recognized acetone as a pathological constituent of the urine associated with diabetes. Since then it has been found to accompany many diseases and conditions, namely:

* Read before the American Orthopedic Association at Chicago, June, 1908.

(1) Malignant growths.
(2) Digestive disturbances.
(3) Sepsis—general and local.
(4) Infectious fevers.
(5) Chronic morphinism.
(6) Injuries to central nervous system.
(7) In cases associated with fatty liver.
(8) In phosphorus poisoning.
It has also been produced experimentally by the administration of phloridzin and the extirpation of the pancreas and solar plexus.
(9) Starvation.
(10) Carbohydrate starvation.
(11) Autointoxication.

Kaulsch, in 1857, gave the first picture of acetonemia—especially associated with diabetes—and experimented by giving acetone subcutaneously in varying doses. With large doses he obtained a reaction, but not with small ones. He compares acetone to alcohol in its accumulative action and considered coma of diabetes due to acetonemia.

Von Jacksch, in 1884, established the fact of a physiological acetonemia, its occurrence in respired air, and endeavored to prove its presence in blood.

Geelmuyden, in 1879, noted that acetone developed during hunger, and also when the patient was on an exclusive proteid diet; and found that acetone formation was prevented if 100 to 200 grms. of carbohydrate food was taken daily. He also noted that the administration of fats caused the formation of acetone.

Baginsky, in 1888, found that acetone occurred in the urine of normal children only in very small amounts; that it was increased by nitrogenous foods and diminished by the carbohydrates. He believed that it was not to be looked for from intestinal fermentation.

Blumenthal and Neuberg, in 1901, endeavored to prove fat as the source of acetone, which had already been shown by

Geelmuyden, who had produced acetone by feeding his subjects on a diet free of carbohydrates and adding fat or fatty acids of the lower series. This work was further supplemented by Swartz, Mohr and Löb, who found that neutral fats possessed the same power, although not to the same degree.

Other experiments show that the quantity of free fatty acids cannot be the factor that determines the increase in the excretion of oxybutyric acid or of acetone, for in none of the cases was more oxybutyric acid excreted than butyric administered.

Naunyn believes that the condition of acetonemia is not due to the amount of acetone in the blood, but that it is an acid intoxication resulting from various fatty acids in conjunction with diacetic and B. oxybutyric acids.

Gerhardt and others have demonstrated conclusively that acetone is associated with diacetic and B. oxybutyric acid in the urine and blood of diabetic patients.

Langstein and Meyer state that in children the principal amount of acetone is excreted through the lungs and not through the urine as in adults. They always found diacetic and B. oxybutyric acid in considerable amounts. The organism of the children invariably reacted to the acidosis by a large increase in the excretion of ammonia. They also called attention to the great danger of fatty diet in children, when there is any disturbance in the carbohydrate metabolism.

Marfan, in 1901, calls attention to vomiting in acetonemia and speaks of the odor of acetone on the breath, which was always present and in some cases detected before the vomiting began. It persisted throughout the vomiting and even in some cases persisted for a day or two longer. In my cases—although the odor of the breath was that usually ascribed to acetone—Dr. Folin believes that it was not due to acetone, but due to some other cause, the source and identity of which is being further investigated.

Brewer (1902) reports a case of acid intoxication following chloroform anesthesia. This case developed an acetone breath on the third day after the operation and later developed marked symptoms of intoxication of the so-called cerebral type and died.

He attributed the cause to an increased acidity of the blood and faulty carbon-dioxide elimination, due to the effect of the chloroform on the fats and the resulting autointoxication.

Becker states that after observing a large number of children he found a pathological amount of acetone after anesthesia in 60 percent. The largest amount was found after chloroform anesthesia.

Guthrie (1903) reports a series of cases where death followed after chloroform anesthesia, giving the diagnosis and hour of death after operation, as follows:

| | No. of hours after death: |
|---|---|
| Infantile paralysis (1), | 10 |
| Genu valgum (2), | 12–13 |
| Tuberculous knee (1), | 16 |
| Congen hydrocele (1), | 24 |
| Vesical calculus (1), | 27 |
| Psoas abscess (2), | 30 |
| Iliac abscess (2), | 53–150 |

Eight cases out of the ten showed a marked cerebral type of intoxication, with restlessness and delirium.

Pyrexia was as usual not a marked feature, the urine was never suppressed. At autopsy, the liver in five out of the eight cases showed a condition of marked fatty infiltration. He attributed the cause of death to this latter fact.

Morse (1905) speaks of the occurrence of "Acid Intoxication in Infancy and Childhood," and believes that the acetone bodies are not found in the urine of comparatively healthy children and infants by the ordinary clinical tests. He believes, however, that they appear in the urine under approximately the same conditions as in adults, and that acid intoxication may be secondary to existing symptoms and not primary as a cause. He states that Schrack (1889) never found the acetone bodies where a pure milk diet was being taken, but did find them in a certain number of cases which were on a meat diet, and they disappeared when an exclusively carbohydrate diet was taken.

Litten (1883) reports three cases with peculiar symptoms in young children—a prodromal stage of a few days was followed by marked nervous symptoms; the children became apathetic, whined, sleep was disturbed and was broken by cries and groans; an aromatic odor then appeared in the breath and drowsiness came on. One of the cases had slight convulsive twitchings. With the appearance of drowsiness, diacetic acid was found in the urine. In two or three days more, all of these symptoms cleared up and recovery was complete. He considers the primary cause of this condition due to a digestive disturbance. As a rule, in acute or chronic gastric intestinal disorders in children, acetone bodies are not found in the urine.

Brackett, Stone and Low (1904) report thirteen cases of aciduria, with four deaths from acid intoxication occurring after anesthesia, with the exception of one case which developed persistent vomiting before operation, gradually became comatose and died. Three of these cases had very extensive atrophy of the muscles of the legs from long standing infantile paralysis. The fourth had marked muscular atrophy of one leg from having been confined in a plaster-of-Paris cast for several months. Of the nine cases which recovered, two had extensive infantile paralysis with its accompanying muscular atrophy; one had muscular atrophy, one had very acute hip-disease associated with atrophy. Thus, all the fatal cases and four of the nine cases which recovered had marked and extensive muscular atrophy. At autopsy all cases showed a liver of a pale yellow color with a condition of fatty infiltration.

Edsall (1903) speaks of "Recurrent Vomiting in Children," and believes that theories, which consider the causation a neurosis or uric acid diathesis, are unsatisfactory. He found that coma was a striking symptom. He found an acetone odor to the breath and the presence of acetone, diacetic acid and oxybutyric acid in the urine constantly with B. oxybutyric acid the chief acid present. He believes that the amount of the acetone present varies with the severity of the symptoms, and concludes that acetone occurs from inanition of any kind, due to prolonged vomiting and absence of the ingestion of food.

Stiles and McDonald (1904) report two cases with autopsy following chloroform anesthesia which showed a marked fatty infiltration of the liver and other organs. The color of the liver was especially noticeable, being a canary-yellow, a condition which has been observed in no other disease. The cause of death is attributed to this condition of fatty infiltration, as a result of the administration of chloroform. Acid intoxication was overlooked as a cause.

Hubbard (1905) had his attention called to acid intoxication by the cases reported by Brewer, and Brackett, Stone and Low, and examined a number of operative cases at the Boston City Hospital. He reports examining 110 cases at entrance to the hospital before anesthesia, nine of which showed the acetone reaction and four were associated with diacetic acid. He reports nine cases out of 145 after anesthesia with acetone which had no symptoms. He reported two deaths, one an acute appendix and one with multiple osteomyelitis, both of which had acetone. He concludes that the occurrence of acetone is frequent; that its presence without symptoms has no effect on operative treatment or prognosis; that its presence with moderate symptoms is of only slight importance, and that its presence with severe symptoms is of grave prognosis.

Kelly, in 1905, reports a series of forty-six out of 400 cases observed from the Boston City Hospital following ether anesthesia, with six deaths. He speaks of the peculiar odor to the breath, but does not call it acetone, and states that when it was noticed acetone was always found in the urine. I think that this statement is correct and that he is right in not saying that this odor was that of acetone, but simply gave a definite clue to its presence in the urine.

Beesly (1906) has presented an excellent article on the significance of delayed chloroform poisoning, and from his investigation concludes that there are two types of acetonemia—*acute* and *chronic;* that ether and chloroform invariably produce acute acetonemia; that this acute anesthetic acetonemia is accompanied by symptoms of acid intoxication which may produce death; that ether is less harmful than chloroform on account of the injurious

action of chloroform on the cells of the liver and kidney; that rapid excretion is essential; that anesthesia is dangerous to a patient with preexisting acetonemia, especially if chloroform is used; that the prognosis must be guarded, and that alkaline treatment usually mitigates the condition. However, in his series, his largest amount of acetone excreted to 50 c.c. of urine in acute acetonemia is 42 mgms., occurring in a case of appendicitis of streptococcus origin that died, with symptoms which might very well have been due to its infection, and not to the fact that acetone was present. In my series I have frequently had more than twice as much acetone excreted without any symptoms whatever.

McArthur (1907) reports a case of fatal acidosis following chloroform anesthesia. He is not impressed with the ordinary alkaline treatment, and the injection of saline solutions; and questions whether or not some treatment may not be devised by which oxygen may be liberated in the tissues, so that the formation of acids be prevented.

Grevan (1895) investigated 251 cases following ether, chloroform and homethyl anesthesia, and reports that acetone occurred in 167 cases. He found that the acetone usually disappeared from the urine within a few days after the operation.

Baldwin (1906), working with Brewer, reports that out of seventy-eight operative cases, sixty-four had acetone in the urine the day after the operation. In a series of ten cases, seven developed acetone two days after operation. In two cases, three days after operation, there was no acetone; in twelve cases of postoperative acetonemia, there was but one case which showed the presence of diacetic acid. Dr. Brewer concludes that in at least 90 percent of cases there is a well-marked acetonemia during the first few hours after anesthesia. Baldwin gave sugar to six cases even up to 150 grms. with no effect on the amount of acetone excreted. The length of operation apparently had no effect on the amount of acetone excreted or on the severity of the symptoms and caused no untoward results.

Falconer and Telford (1906) report three fatal cases following chloroform anesthesia and also their results on 118 operative cases. In the examination of 143 cases before anesthesia, they

found seventeen cases with diacetic acid present in the urine and thirty with acetone. Of the 143 cases reported thirty-three were septic, of these twelve showed the presence of acetone and diacetic acid. They also noted that in a series of 118 postanesthetic cases there was vomiting in but thirty-four due to acetone, and vomiting of unusual severity in only four. The conclusions they reached were as follows:

(1) That the kind of anesthetic used was of no importance.

(2) That acetone occurs in the vast majority of cases.

They also concluded that the length of the period of anesthesia has no definite relation to the duration of the acidosis. They believe that it may occur in perfectly healthy people without anesthesia and without prejudicial effects. They also state that the changes in the diet had no effect on the condition of acidosis.

Bevan and Favill (1905) report a fatal case following anesthesia and give a list of the fatal cases as follows:

| | |
|---|---|
| Bastianelli, | 3 |
| Bandler, | 1 |
| Ballini, | 1 |
| Brackett, Stone and Low, | 4 |
| Brewer, | 1 |
| Colin, | 1 |
| Erlach, | 1 |
| Guthrie, | 14 |
| Kelly, | 1 |
| Marthen, | 1 |
| Stocker, | 1 |
| Mintz, | 1 |
| Bevan and Favill, | 1 |
| Total | 31 |
| Chloroform in, | 23 |
| Ether in, | 4 |
| Not noted, | 4 |

They believe that from their review of the literature and the reports of autopsies that the greatest injury is done to the liver

as a result of the anesthetic, which is always found infiltrated with fat and of a light yellow color. They believe that the injury to the liver is in direct ratio to the amount of anesthetic given and the duration of the operation. This opinion, however, does not bear great weight in view of the great amount of contradictory evidence. This, however, may be to a certain extent true so far as chloroform is concerned; it does not hold good with ether.

Talbot (1908) speaks of the occurrence of acid intoxication and its occurrence in connection with its destructive effects on the teeth, particularly in diabetic subjects. Out of 394 examinations nineteen were examined for acetone, with the result that it was found in eleven cases; diacetic acid was found in six cases out of thirty-two; in the twenty-four cases in which it was looked for, B. oxybutyric acid was absent.

Langmead (1907), in speaking of the "Acetonemic Condition of Children," divided his patients, in whose urine acetone and diacetic acid were found, into three groups:

(1) Those with no symptoms. These include cases of excessive fat ingestion, starvation, gastric ulcer, malignant disease, and others due to the deprivation of the carbohydrates.
(2) Those while suffering from other morbid states have symptoms of acid intoxication, such as diabetes, sepsis, peritonitis and poisoning.
(3) Uncomplicated acidosis which may end fatally, *i.e.*, delayed anesthetic poisoning, cyclic or cryptogenic acidoses.

He reports three cases with symptoms following previous anesthesia. In two of the cases chloroform was used, and in one nitrous oxide gas, which last recovered. He also reports three cases of fatal acidoses in the course of recurrent vomiting. In all five fatal cases, the autopsy showed a fat, buff-colored liver, which on microscopic examination showed fatty degeneration and infiltration. This condition was also found in the other organs, but not

to such an extent. He considers, in concluding, that acetonemia is a failure of the fat oxidation. He also believes that delayed anesthetic poisoning is due not so much to the kind of anesthetic used as to the state of anesthesia.

Ladd and Osgood (1907) examined 120 cases in reference to the occurrence of acetone in the urine as the result of the "cone method" of administering ether and the "drop method." In 120 cases etherized by the "cone method," acetone was present in 88.5 percent of the cases, while in the "drop method," but 26 percent showed the reaction for acetone in the urine. They used on an average about seven ounces of ether per hour. They believe that the "drop method" is the better way of administering the anesthetic.

Longo (1907) examined the urine in 103 cases with a view to the occurrence of acetone after operation and found it present in every one. Seven percent of his cases showed acetone before operation, although in other respects they were normal individuals. He states that acetone was much more often seen after ether narcosis (nineteen out of twenty cases) than after chloroform anesthesia (fifty-one out of fifty-seven), and in each case it was most marked immediately following the operation. In seven cases operated upon with local anesthesia (cocaine) acetonemia followed in every instance. In fifteen cases of traumatism, or operation without the use of an anesthetic, acetone was noted in seven, and in three cases of single chloroform narcosis without operation acetone followed every time. Longo believes that a condition of postoperative acetonemia is an almost constant one, but also that it is a temporary one. The low diet after an operation seems to prolong the condition a little, but it does not appear to be due to fasting, although this condition and early years act as predisposing causes. The essential elements in postoperative acetonemia seem to be the narcosis and trauma. In his experience the postoperative coma is not influenced by the presence of acetone, which he held is due to a functional alteration of the central nervous system.

Young and Williams (1908), in a recent article, believe that acetonemia may be due to gastroenteric disturbances, and that ace-

tonemia following operation may be due to other accompanying diseases, especially sepsis, which causes a disturbance in the normal metabolism.

From this review of the literature we may state that many of the observers have arrived at similar conclusions in regard to the effects of fat on the production of acetone, its control by proper administration of the carbohydrates, its generally favorable prognosis, except when due to the administration of chloroform, which seems to have some particularly selective action on the liver, and the resulting fatty infiltration of that organ as found at autopsy. In the uniform results of autopsies and the similarity of the various symptoms all agree. Apparently nearly all conclude that the length of anesthesia, the amount administered, and the duration of the operation play no part in the severity or duration of the symptoms. Also that children suffering from depleting diseases are more subject to the conditions following anesthesia, and that children may develop a condition of acetonemia from the most trivial causes without anesthesia. That a normal acetonemia may exist in children without symptoms and that such a condition of chronic acetonemia may exist in children who are the victims of long-standing diseases, such as tuberculosis or sepsis.

These conclusions also hold good to a large extent in the consideration of adults, but not to such a degree. Leaving the literature, I will now go on to the consideration of the chemical processes involved in the production of the condition known as acid intoxication. Many attribute the toxic conditions not so much to acetone as to its two higher bodies—diacetic acid and B. oxybutyric acid.

## Chemistry and Theories of Acetone Found in Acid Intoxication.

According to Von Jacksch, De Boeck and A. Slosse, normal urine contains traces of acetone (0.10 grm.) in twenty-four hours, which might be called physiological acetonemia. Le Noble claims that it is only found in the urine of healthy persons after

using alcohol and food rich in proteid materials. Von Jacksch thinks that the principal source of acetone is the decomposition of the proteids of the body as well as of those which are taken with the food. It is true that the ingestion of an abundance of nitrogenous foods tends to a production of acetonemia.

Joslin has found in studying "The Influence of Various Fats on the Formation and Excretion of Acetone" that excessive quantities of fat given to a healthy individual causes the excretion of a large amount of acetone, and that the increase is closely related to the amount of carbohydrates in the diet. He found that the neutral fats, whether of the lower or higher fatty acid series, did not increase the elimination of acetone in a healthy person during starvation for a period of two days. He believes that the glycerin which the fats contain tend to prevent the formation of acetone.

Geelmuyden, however, has shown that if a subject is fed on a diet free of carbohydrates, the addition of fat to such a diet increases the excretion of acetone, and Schwarz, Mohr and Löb have shown that neutral fats possess the same power. Other experiments show that the quantity of free fatty acids cannot be the factor that determines the increase in the excretion of oxybutyric acid or of acetone, for in some of the cases more oxybutyric acid was excreted than butyric acid given.

## Acid Intoxication.

Normally the blood carries away the $Co_2$ from the tissues to the lungs in combination with the inorganic alkalies of the blood of which sodium is by far the most abundant. This combination is the bicarbonate-soda or other base, which in the lungs is decomposed into the carbonate, the $Co_2$ escaping into the alveolar air according to this equation:

$$2NaHCo_3 = Na_2Co_3 + H_2O + Co_2.$$

The carbonate thus formed goes back to the tissues to again combine with more $Co_2$ and form bicarbonate. If acids are in-

troduced to the blood they combine with the alkali there, forming neutral salts which are eliminated in the urine. In this way the amount of alkali in the blood is reduced with a consequent reduction in the capacity of the blood to carry $Co_2$ away from the tissues; the amount of $Co_2$ in the blood sinking from the normal 24 percent to as low as 2.5 percent to 3 percent. Consequently in acid poisoning the $Co_2$ produced in metabolism accumulates in the tissues, where it has been formed and blocks the process of oxidation, so that one suffers from an asphyxia exactly as if deprived of air. The lack of alkalinity in the blood in acid intoxication checks the internal respiration, as intracellular gas exchange is called, by preventing the removal of $Co_2$ from the cells. In these cases the ammonia excreted in the urine is decidedly increased.

Acid intoxication is probably due to a failure of complete oxidation of organic acids produced in metabolic processes. Other investigators have believed that the liver fails to burn or oxidize the organic acids formed, and that in states of acid intoxication ammonia appears in the urine because it has been divested from the synthesis of urea to neutralize the acid, and not because the liver is incapable of carrying on this fundamental activity. It is believed that we owe the origin of acetone partly to the decomposition of the proteids of the body cells, and that it is found in pathological amount whenever tissue waste is excessive. The acid which passes from the blood to the urine withdraws the alkalies from the organism, sometimes in large amounts, and so long as the cells are able to offer sufficient ammonia for the neutralization of the pathological organic acids that are found in the body, the alkalescence of the blood is not diminished, but just as soon as this alkali resource proves insufficient for the complete neutralization of the acid or acids, and sometimes sooner, the alkali of the blood is sacrificed to effect the necessary neutralization. This results in a reduction of the alkalinity of the blood, and therefore acid intoxication. A considerable permanent reduction in the alkalinity of the blood is incompatible with the maintenance of life.

The amount of alkaline substance in the blood is not very

great. It is said to amount to 180 mgms. of NaOH in 100 gms. of blood.

From a later research we quote Benedict (Cheinisse: Sem. Wed. Sch. 19, 08, Vol. XXVIII, No. 8), who concludes from his investigations that in diabetic coma there is no actual acid intoxication, the blood persisting neutral even in cases of abnormal production of acids; for he found the proportion of hydroxyl ions constantly approximating the normal. Until further work is done, however, we may accept the theories advanced above.

## Acetone Bodies.

B. oxybutyric acid, diacetic acid and acetone: these three substances are closely related to one another. Oxybutyric acid is also called an oxy acid with a secondary alcohol group. Like all acids of this character, it is readily converted into its keto acid; viz., diacetic acid by oxidation. The latter can be considered as acetone in which one hydrogen atom is substituted by the carboxyl group. If diacetic acid is warmed or boiled, acetone and carbon dioxide are formed. It has been shown by various experiments that these acids when eliminated in the urine, are the result of faulty oxidation from a common cause, and by studying these acetone bodies we are able to gauge the intensity of the perversion of oxidation.

While protein and fat can lead to the formation of acetone bodies, the fatty acids probably constitute its chief source. Brackett, Stone and Low have experimented on the toxicity of acetone by injecting large amounts intraperitoneally and subcutaneously into guinea pigs without causing anatomical lesions, unless the administration was prolonged for many days, and it is probable, as Naunyn says, that acetone *per se* is practically harmless.

Desgrez and Saggio found that the lethal dose by intravenous injection per kg. rabbit of acetone was 4.855 grms.; of diacetic acid, 2.174 grms.; of B. hydroxybutyric acid, 1.095 grms., and of propionic acid, 0.45 grms. The injection of 0.109 grms. of acetone daily for 2.5 months failed to kill guinea-pigs; a similar

dose of diacetic acid was fatal to some of the animals, and the injection of 0.04–0.05 grms. B. hydroxybutyric acid killed most of the animals. The symptoms of such chronic intoxication were diminished urine, emaciation and diminished elaboration of the nitrogenous substances by the liver. I wish to make it clear here that the diacetic acid and the B. oxybutyric acid that accumulated in the blood and urine in acid intoxication or acetonemia are only toxic because they are acids, and that the injurious effects produced are only the results of the withdrawal by them of the inorganic bases from the blood. Beyond this they are not toxic, and their neutral salts are practically harmless. Acetone is but very slightly toxic, resembles ethyl alcohol in its effects, and the lethal dose for a human has been estimated at 500 grms., while seldom more than a few grams are found in the urine in the most profound cases of acidosis or acetonemia. I believe that the presence of these substances in the urine must be looked on as one of the manifestations of the disease that is producing the other accompanying symptoms of intoxication.

## Object of Inquiry.

The number of cases observed has been large—in all about seven hundred and fifty—which have included all kinds of orthopedic and surgical diseases. The urine has in a number of cases been examined by quantitative methods for acetone, and in these cases also there has been a careful regulation of the food digested. It has been found that by collecting and examining the urine at six-hour intervals, we could more nearly approach a true estimate of its acetone value and toxicity. All cases which have had quantitative estimates have had urine specimens for at least two days before operation, with food regulations during that time. If no acetone was present before operation, we then had data to work with as regards the effect of the operation; and if acetone was present before the operation a check could be kept on its increase as a result of the anesthetic and the trauma and exposure of the operative procedures. The questions of knowledge of operation, homesickness, fright, manipulations, plaster applications, with and

without ether, were also noted. Also the length of operation, the gravity and the amount of anesthetic used were noted. In this way a pretty clear idea was obtained in regard to the conditions surrounding the production of acetone.

I shall now take up the cases I have studied and endeavor to establish certain facts in regard to the following points:

(1) The occurrence of acetone in the urine of apparently healthy children.

(2) What conditions affect the existence of acetone in the urine of healthy children.

(3) If acetone exists more frequently in children with disease, such as tuberculosis, paralysis, sepsis, etc.

(4) To determine the condition under which acetone appears in the hospital:

(a) Immediately before operation and caused by the knowledge or fear of it;
(b) After operation, with class of operation and cases;
(c) Time of appearance and greatest amount;
(d) Symptoms accompanying it and relation of symptoms to quantitative tests;
(e) Time of disappearance;
(f) Its occurrence after manipulation and nonanesthetic disturbances during plaster, etc.;
(g) Application of plaster and manipulations, with ether;
(h) Character of ether breakfast and time given;
(i) Influence of diet;
(j) General symptoms;
(k) Various treatments and effects of such.

These points, I think, cover the ground pretty well, and although I cannot speak definitely in regard to all of them, I have acquired pretty well formed ideas as to their significance. These points will be taken up in order and an attempt made to answer them in a more or less definite fashion.

TABLE NO. I.

| | |
|---|---|
| Number of operations, | 681 |
| Acetone after operation, | 662 |
| Acetone before operation, | 136 |
| Number with symptoms after operation, | 60 |
| Odor on breath marked, | 18 |
| Average days' duration, | 3.2 |
| Acetone with bed treatment without operation, | 55 |
| Acetone with plasters and anesthesia, | 15 |
| Died with acetone, etc., | 16 |

### (1) THE OCCURRENCE OF ACETONE IN THE URINE OF APPARENTLY HEALTHY CHILDREN.

This point I have made no special effort to cover except from the routine examinations of the urine of those children who have been admitted to our wards with such conditions as club-foot, knock-knees, bow-legs, hernia and other conditions which may need the so-called operations of election. I have found that but forty-four children showed acetone in the urine before operation out of the great number admitted. The conditions were alike in all cases, and probably the hospital routine of change of diet, and generally free evacution of the bowels, with a change of environment, caused this idiosyncrasy. According to others, Baginsky (1888) and Langstein and Meyer (1905), acetone may be found in the urine of apparently healthy children, but rarely exceeds 1 c. grm. in 24°. Schrack (1889) states that acetone may be found in the urine of children from the most insignificant of causes. No quantitative tests were used on these cases, but the urine was tested by the qualitative test, using a sodium nitroprusside solution, ammonium hydrate and acetic acid. This test was controlled by the ferric chloride test for diacetic acid so as to get an approximate estimate of the quantity of acetone being excreted. There was apparently no relation between the amount of acetone and diacetic acid excreted and the child's condition and symptoms. For the greater part, they had no symptoms and were usually up and about the ward.

## (2) What Conditions Affect the Existence of Acetone in the Urine of Healthy Children.

In the forty-four cases already mentioned above, the conditions and diagnoses were as follows:

| | | | |
|---|---|---|---|
| Club-feet, | 8 | Keloid, | 1 |
| Knock knee, | 4 | Nevus, | 1 |
| Bow-legs, | 4 | Atresia vagina, | 1 |
| Congenital hip, | 8 | Hydrocele, | 1 |
| Congenital deformity, | 3 | Prolapse rectum, | 1 |
| Hernia, | 10 | Scoliosis, | 1 |
| Hypospadias, | 1 | | |

In all of these cases acetone was usually found the day after entrance. In several of the cases it did not occur until two days had elapsed. In most of the cases there were the usual symptoms, and in five, the sweetish odor on the breath was noted. Two of the cases vomited somewhat, and in several the condition was attributed to the fact that the children refused nourishment. None of the children died, but a number were discharged on account of the persistence of the acetonemia. In none of these was there a quantitative test made of the acetone in the urine, as these cases were observed before the present investigation was started. However, it may be safely stated that a new environment, change in food, perhaps homesickness or fright, not of operation, but because of their new surroundings and loss of appetite, resulting in a loss of a proper amount of food, with confinement to bed, have resulted in these conditions; other than these observations we can go no further at present.

In addition to the other usual tests, I used in a large number of cases the so-called "breath absorption test," which is as follows and is probably familiar to all: 5 c.c. of $\frac{10}{N}$ iodine solution is mixed with 10 c.c. 10 percent ammonium hydrate solution and diluted largely with water. The child then blows into this solution through a glass tube with a specially shaped glass bell on the end which is immersed in the solution. This is kept up for two or three minutes. At the end of that time, if there is any acetone being excreted through the lungs, it causes a precipitation of

iodoform in the solution, which can be readily recognized by the smell. It can also be identified by centrifugalizing the solution and examining the sediment under the microscope. This test was found so delicate that it was found positive in very nearly all the children on whom it was tried. It shows acetone present, when even the clinical tests of the urine fail. It is of no great significance, however, on account of its great delicacy.

(3) If Acetone Exists More Frequently in Children with Disease Before Operation, such as Tuberculosis, General or Localized, Paralysis, Static or Infantile, Sepsis, etc.

Table No. II.

Acetone Before Operation.

(136 Cases.)

| | | | |
|---|---|---|---|
| Club-feet, | 8 | No diagnosis, | 3 |
| Knock knee, | 4 | Appendix, | 6 |
| Bow-leg, | 4 | Cardiac, | 1 |
| T. b. hip, | 14 | Cervical adenitis, | 5 |
| T. b. spine, | 19 | Inf. paralysis, | 12 |
| T. b. knee, | 2 | Empyema, | 5 |
| T. b. testicle, | 1 | Hernia, | 10 |
| T. b. peritonitis, | 1 | Harelip, | 3 |
| Congenital hip, | 8 | Hodgkins disease, | 1 |
| Congenital deformity, | 3 | Hypospadias, | 1 |
| Brain tumor, | 2 | Lymphoma of face, | 1 |
| Keloid, | 1 | Typhoid fever, | 1 |
| Scoliosis, | 1 | Prolapse rectum, | 1 |
| Spina bifida, | 1 | Spastic paralysis, | 2 |
| Nævus, | 1 | Sarcoma of kidney, | 2 |
| Fracture clavicle, | 1 | Osteomyelitis, | 5 |
| Fracture, 2 bones, 2 legs, | 1 | Hydrocele, | 1 |
| Rupture kidney, | 1 | Multiple T. b., | 1 |
| Atresia of vagina, | 1 | Pyelitis, | 1 |

It was found that a number of these children who were usually underdeveloped and nourished and showed atrophy of muscles and depletion from the presence of their respective diseases, showed acetone in varying amounts in the urine; eighty-two out of the 136 which showed acetone before the operation belonged to

this class, giving a rather large proportion. This has been true with other observers also, and is undoubtedly due to their depleted condition, from their particular disease and their lack of sufficient food. It had, however, no apparent effect on their condition, and they had no symptoms whatever from its presence. After operation patients of the same class, to the number of 313 out of a total of 662, showed the presence of acetone and diacetic acid to a greater or less degree; fifty-five cases which were almost altogether tubercular spine and hip cases, showed the presence of acetone in their urine in varying amounts, merely during confinement to bed. Rarely they had symptoms, and if any appeared were only transient, lasting but a day or so. The usual symptoms were flushing of the face, dry lips and very slight restlessness or dullness, and in a few cases these symptoms were accompanied by vomiting. The urine often showed large amounts of acetone and diacetic acid.

(4) To Determine the Conditions under which Acetone Appears in the Urine of Children in the Hospital.

(*a*) *Immediately before operation and if caused by the knowledge and fear of it.*

Notes on about two hundred cases were taken in regard to this point. No connection could be traced between them and their relation to the amount of acetone excreted or the severity of the symptoms. Many cases, especially in the older children, were perfectly well aware for what purpose they were in the hospital, and it is well worth noting the marked indifference with which they looked forward to their day of operation. This is true even in cases which have had previous experience. I think that one may safely state that knowledge and fright have no etiological significance in acetone formation. Brackett, Stone and Low have also arrived at this same conclusion.

(*b*) *Acetone after operation with classes of operation and cases.*

TABLE NO. III.

Diagnosis.

| | | | |
|---|---|---|---|
| Club-feet, | 41 | Cervical adenitis, | 43 |
| Cong. dislocation hip, | 50 | Appendix, | 35 |
| T. b. hip, | 28 | Cleft palate, | 17 |
| T. b. spine, | 30 | Hare lip, | 17 |
| T. b. knee, | 19 | Osteomyelitis, | 30 |
| Congenital deformity, | 12 | Empyema, | 29 |
| Knock-knees, | 30 | Obstetrical paralysis, | 3 |
| Bow-legs, | 42 | T. b. elbow, | 2 |
| Infantile paralysis, | 63 | T. b. peritonitis, | 2 |
| Spastic paralysis, | 12 | Torticollis, | 6 |
| Hernia, | 138 | Scoliosis, | 1 |
| Coxa vara, | 4 | Lymphosarcoma, | 1 |
| Hypospadias, | 8 | Compound fracture, | 1 |
| T. b. jaw, | 3 | Hammer toe, | 1 |
| Abscess, | 35 | Poisoning, potash, | 1 |
| Fractures, | 20 | Vesico-vaginal fistula, | 1 |
| Osteomalacia, | 1 | Cardiac lesions, | 1 |
| Nevus, | 6 | T. b. testis, | 1 |
| Burns, | 4 | Keloid, | 2 |
| Spina bifida, | 1 | Ruptured kidney, | 1 |
| Sarcoma thigh, | 1 | Septicemia, | 2 |
| Stricture esophagus, | 1 | Papilloma larynx, | 4 |
| Intestinal obstruction, | 24 | Sarcoma kidney, | 2 |
| Still's disease, | 1 | Fracture skull, | 1 |
| Hydrocele, | 3 | Ovarian cyst, | 1 |
| Brain tumor, | 2 | Pyelitis, | 1 |
| Hodgkins, | 1 | Chondrodystrophia, | 1 |
| Epilepsy, | 1 | Typhoid, | 1 |
| Prolapse rectum, | 4 | Hypertrophied turbinates, | 1 |
| Synovitis, | 3 | T. b. ankle, | 1 |
| Phimosis, | 2 | No diagnosis, | 5 |

TABLE NO. IV.

Showing Occurrence in Sexes in Periods of Years.

| *Girls.* | | *Boys.* | |
|---|---|---|---|
| No. aged 1 or under, | 9 | No. aged 1 or under, | 32 |
| No. aged 2 or under, | 51 | No. aged 2 or under, | 58 |
| No. aged 3 or under, | 35 | No. aged 3 or under, | 63 |
| No. aged 4 or under, | 45 | No. aged 4 or under, | 72 |
| No. aged 5 or under, | 42 | No. aged 5 or under, | 50 |
| No. aged 6 or under, | 30 | No. aged 6 or under, | 24 |
| No. aged 7 or under, | 35 | No. aged 7 or under, | 32 |
| No. aged 8 or under, | 26 | No. aged 8 or under, | 30 |
| No. aged 9 or under, | 17 | No. aged 9 or under, | 30 |
| No. aged 10 or under, | 25 | No. aged 10 or under, | 15 |
| No. aged 11 or under, | 17 | No. aged 11 or under, | 15 |
| No. aged 12 or under, | 13 | No. aged 12 or under, | 10 |
| No. aged 13 or under | 2 | No. aged 13 or under, | 1 |
| No. aged 14 or under, | 3 | No. aged 14 or under, | 1 |
| | 330 | | 433 |

Anesthesia is an apparent and distinct cause of acetonemia. Out of 681 operations acetone occurred in the urine in 662 with symptoms of acid intoxication in only sixty. In but ten of these was the so-called acetone odor of the breath marked. Three hundred thirty of these cases occurred in girls and 433 in boys, showing that boys are more readily subject to this condition. The age ranged in both sexes from several days of age to 14 years, but for purposes of classification all ages are grouped in years from one to fourteen (see Table IV). From two to eight were the most susceptible ages in girls, and 2 to 9 in boys. The diseases in relation to the occurrence of acetone may be seen by referring to Table III.

Congenital dislocation of the hip, club-feet, tubercular hip and spine, bow-legs, infantile paralysis, hernia, abscesses, cervical adenitis and osteomyelitis show the diseases in which we have had acetone occur most frequently.

Apparently, reasoning from these, then, we may say that in conditions where the child is poorly nourished, febrile or has been subject to severe bone operation or manipulation, acetone is most likely to occur. From our observations on the length of the period of anesthesia and the amount of anesthetic used, we are able to state that neither of these have any undue influence on the quantity of acetone found in the urine or the severity of symptoms.

The average amount of ether used, which has been practically altogether our anesthetic, has been $4\frac{1}{3}$ oz. The average length of the operation has been one half-hour. The longest operations have been the cleft palate and harelip operations, which have occasionally lasted two hours and used 12 oz. of ether, while the shortest ones have been of but a few minutes' duration for the incision and drainage of an abscess. Most of the cases of osteomyelitis have been acute, and generally the case one of marked constitutional reaction to the infection. In these cases one naturally expects acetone.

The cases of congenital dislocation of the hip, club-feet, bow-legs and knock-knees are usually pretty healthy, but undergo great muscle bruising and stretching and considerable exposure

and trauma during the stages of the operative procedures. The question of trauma and exposure to the patient enters in here, and I question whether or not both of these conditions do not have considerable to do in causing favorable conditions for the formation of acetone. So far we have not been able to prove that they have, but further observations may throw more light upon this phase of the subject.

(*c*) *Time of appearance of acetone after operation with period of greatest excretion.*

Contrary to Beesly, who found that he obtained the maximum amount of acetone excretion within 24 hours after operation, and Longo, who states that the nearer the examination is made after the operation the greater the amount of acetone, I did not discover any such relation. By collecting and examining the urine in six-hour periods and examining it quantitatively by Folin's modification of the Messinger-Huppert test, we found that no such relation existed.

This is well shown by a study of the accompanying charts. It appeared, as a rule, at once after the operation and lasted on an average three days.

The period of greatest excretion as shown by the charts is as follows:

Case I.—The greatest amount found was during the first 6-hour period, a total of 37.76 mgm.

Case II.—Showed the maximum amount, 39.76 mgm., at the end of the first 6° period.

Case III.—Showed the maximum at the end of the first 6° period, 45.86 mgm., but two days later showed amounts of 37.16 mgm., 36.86 mgm. and 38.66 mgm.

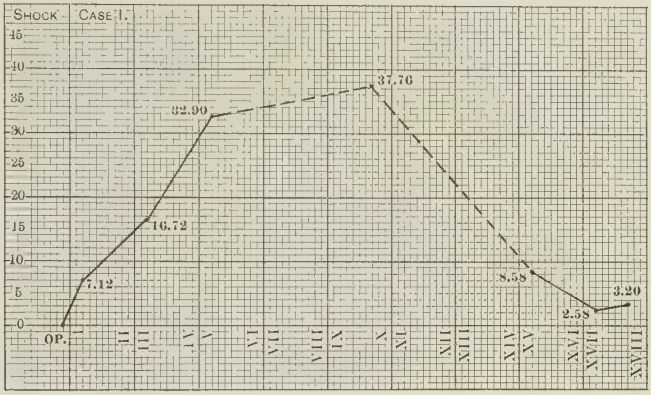
Case IV.—Showed the maximum found in the seventh period, 41.78 mgm., or forty-two hours after operation.

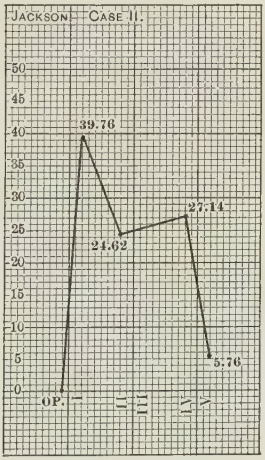
Case V.—Showed 51.52 mgm. within 24° after operation, but five days after operation showed a larger amount; *i. e.*, 55.64 mgm., and again almost two days later showed 40.88 mgm.

Case VI.—Showed 36 hours after operation a maximum of 43.06 mgm.

Case VII.—Showed its maximum excretion three days after operation, 30.60 mgm.

Case VIII.—Its maximum came during the fourth 6° period, or within 24°, a total of 43.80 mgm. for that period.



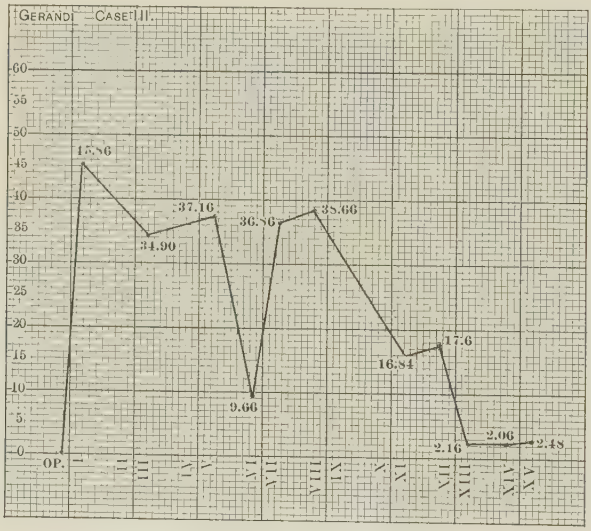



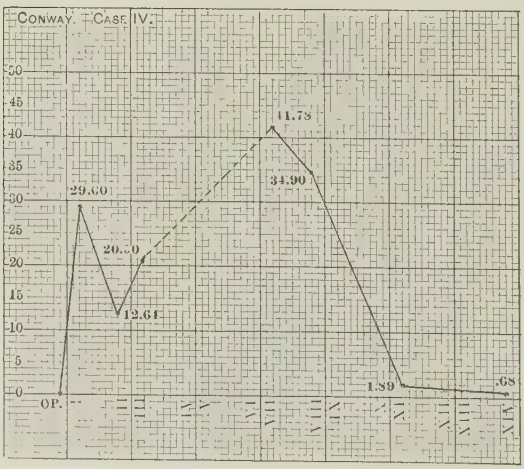

Case IX.—Showed a total of 23.56 mgm. in the seventh 6° period, nearly two days after operation.

Case X.—Showed the maximum excretion within thirty hours, or a total of 31.36 mgm.

Case XI.—Showed the maximum excretion forty-eight hours after operation, with a total of 53.58 mgm.

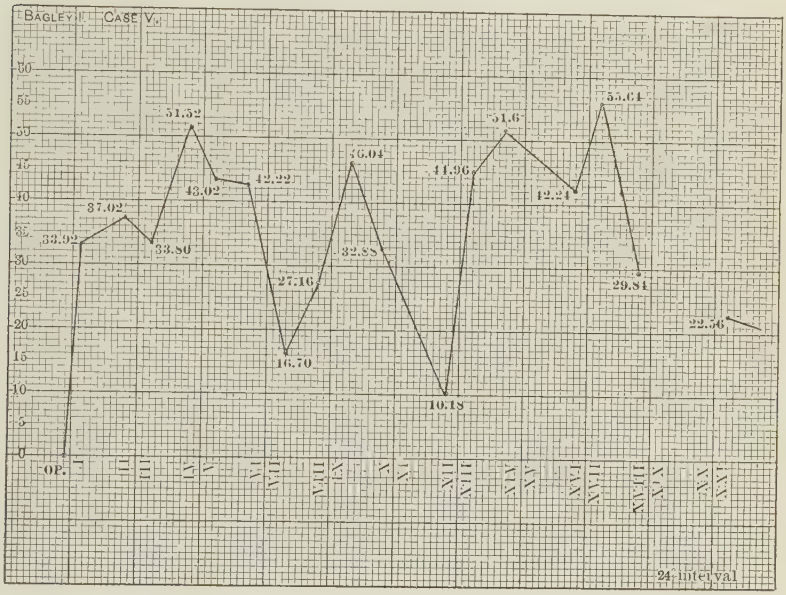
From these figures, then, we can definitely state that "the

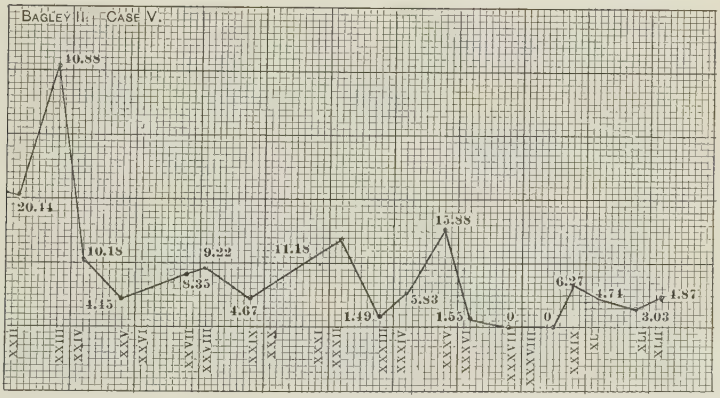



nearer the operation the greater the amount of acetone" is not so. We had but three cases out of the eleven in which the maximum

was reached in the twenty-four hours immediately following the operation, two in the first six-hour period and one in the fourth period.

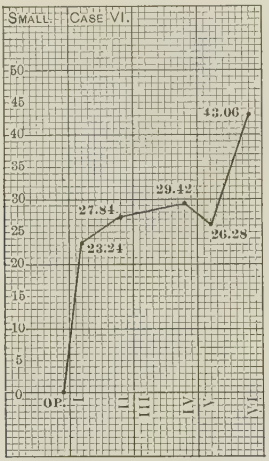


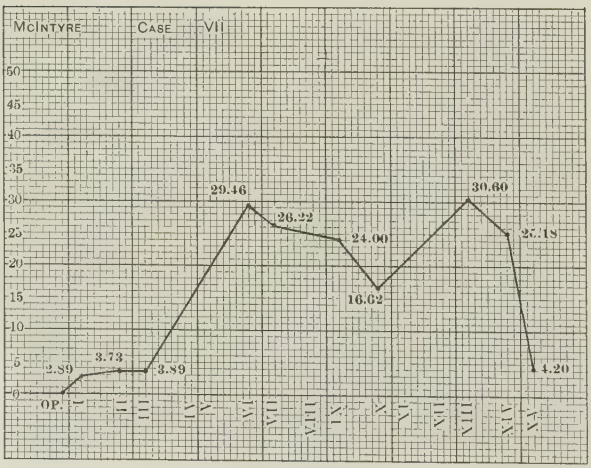




*(d) Symptoms.*

The usual symptoms were flushed face, dry lips, slight dullness

or apathy and occasional restlessness. We had no cases such as Brackett, Stone and Low have described, except those of theirs that are included in the statistics of this paper and which

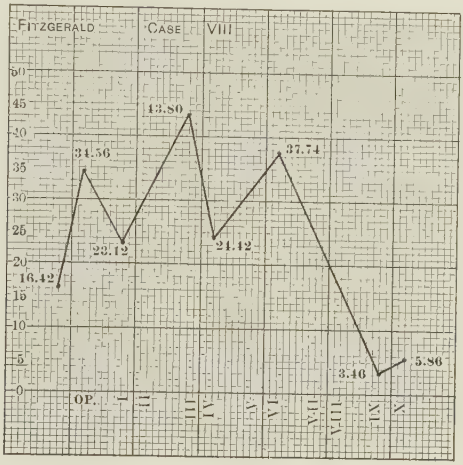


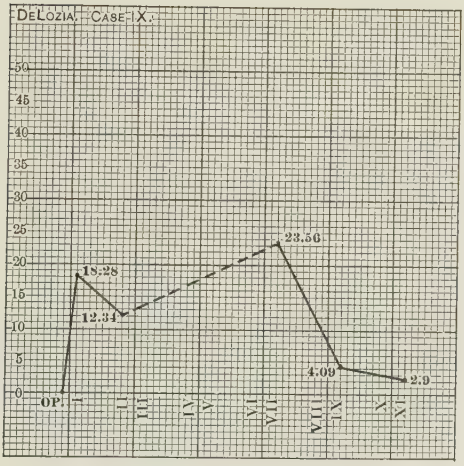




may be studied by referring to their article. Large quantities of acetone had absolutely no effect on some cases; one case, for instance, excreted 979.49 mgm. in twenty-four hours without showing the slightest constitutional disturbance. This in itself

must rule out acetone as a cause of the symptoms of acid intoxication.

But sixty cases out of the total showed symptoms following operation. The duration of the symptoms did not coincide




with the period of acetone excretion. Also in several cases it is of interest to note that when small amounts of acetone were excreted, namely in Cases VI, VII and XI, there were symptoms

present, which cleared up when the acetone excretions became more pronounced. This was always, however, within twenty-four or forty-eight hours after operation, and did not occur later when the acetone excretion became less. This may show that there exists some relation between the small amount excreted soon after operation and the severity of the symptoms, which may be the result of the absorption of the products of faulty metabolism and lack of proper elimination of these, and therefore a more severe acid intoxication.

(*e*) *Time of Disappearance.*

From a study of my statistics and cases, I found that acetone usually came on at once after the operation; that is, it was discovered in the first specimen of urine passed after the administration of the anesthetic. This condition persisted usually several days, the average being 3.2. In some cases it was apparently but a transient condition, lasting only a few hours, in others it was noted as lasting even up to twenty-two days after operation, even when the child was convalescent and practically well.

A small proportion of the cases would show no acetone reaction until one or two days after the operation. This is probably the result of the combined effects of the operation, which was not in itself enough to produce a condition of acetonemia, and the enforced period of starvation or diminished food ingestion during the twenty-four or forty-eight hours following the operation.

(*f*) *The occurrence of acetone after manipulation and nonanesthetic disturbances, such as dressings, application of plaster, etc.*

This interesting point was called to our attention in the case of a child who had been operated upon two days previously for torticollis. Following the operation there was no acetone noted, but at once following the manipulation necessary in putting on the plaster without ether the child developed a condition of acute acid intoxication. This might easily be explained by the fact that it had already gone through a good deal, had been confined to bed with its head fixed and had had very little nourishment for a period of two days. The manipulation necessary and the consequent strain on the child were enough to upset its metabolic

equilibrium and thus produce a condition of acetonemia. Other cases, such as scoliosis, which had had corrective jackets, and congenital dislocation of the hip, which had new plaster applied, did not, as a rule, develop acetone. However, certain cases of congenital dislocation of the hip did develop a moderate acetonuria without symptoms following such procedures. These cases for the greater part had been confined to bed for a long period in plaster, and their balance was therefore easily upset. As a rule, dressings have had no effect on the acetone excretion.

(*g*) *The application of plasters, manipulations and dressings with anesthesia.*

In fifteen cases the administration of an anesthetic produced a temporary acetonemia, differing apparently in no way from the condition produced after more extensive procedures. This is true especially in cases where much manipulation had to be done or where force was used, as in the correction of a club-foot and the reduction of a congenital dislocation of the hip. Such children were in a condition to be easily influenced, and these procedures were apparently enough to upset the balance. Beyond this there was no apparent cause.

(*h*) *Influence of the "ether breakfast."*

Up to the past three months all cases have had in preparation for their operation an "ether breakfact," that is, all but emergency cases, consisting of about six ounces of bouillon. This seems to me to be a distinct cause in the production of acetone, for it meant practically starvation for about fifteen or sixteen hours; that is, the night before the operation the child would have an active cathartic after a light supper about 5 or 6 o'clock. In the morning it would have an enema and its bouillon given three or four hours before the operation time. In this way, if the operation was delayed, as is often the case, the patient was in a starved condition when ether was given, thus creating most favorable conditions for acetone formation. Three months ago I started giving the patients 6 oz. of rice or rice gruel three hours before operation, so that they might have a moderate amount of carbohydrate food as a prophylactic. This answered well in all cases

except abdominal ones, where it was apt to create too great distention for allowing good and easy work in the peritoneal cavity. It has, however, caused no appreciable decrease in the amount of acetone excreted. Whether or not it has prevented any serious cases of acid intoxication, I cannot say. At present we are feeding a certain number of acetone cases on 150 grms. of milk-sugar a day to determine, if possible, any effect on the acetone excretion in variance with what we have already determined. This has not as yet been fully worked out.

(*i*) *Influence of diet.*

Before going into the discussion of the diet, I wish to present to you the list of the usual hospital diets, which are as follows:

*House Diet.*—Cereal, crackers and milk, bread, chopped beef, mashed potato, bread pudding, bread, milk, fruit, bread and sauce or molasses, crackers and milk, beef stew, eggs.

*Soft Solid.*—Same as house diet, except meat.

*Liquid Diet.*—Eggnog, broth, milk, albumen water, etc.

*Infant Diet.*—Milk, soft toast, soft boiled eggs.

*Milk Diet.*—Nothing but milk.

These diets were all that the children got during this investigation, with the exception of the ether breakfast. The relation of the food taken to the amount of acetone excreted may be seen on the chart.

From a study of this it may be noted that the food taken had very little or no influence on the amount of acetone excreted. What might have been the case if the carbohydrates had been pushed was not determined, for we were endeavoring to establish certain fundamentals on which to base further research. So far, however, we can state that in our cases the quantity and character of food taken has had no apparent influence.

(*j*) *General symptoms.*

I have already spoken of the more usual symptoms above. These symptoms have been common to all cases of my own, and to all those of other investigators, varying perhaps only in severity. To reiterate, they are as follows, in usual order of occurrence:

apathy or dullness, flushing of face, restlessness, dry lips, bright eyes, sweet odor to breath, vomiting, occasional or persistent, delirium, coma and death.

*Causes of death.*

By consulting Tables V and VI, the cause of death may be seen in the sixteen cases which died. In more than half of the cases (nine) there was sufficient in the disease alone to cause death, and I think that there was no question but what these cases died of their disease, and not of the acid intoxication, which was but an accompanying condition.

The cases of infantile paralysis have already been described with their autopsy records in Brackett, Stone and Low's paper. The cases of hernia (three) and of cleft palate (one), which died, had no autopsy, so we were unable to confirm the results already found by others.

There were two boys, aged two years and one aged seventeen months—hernia patients who died with distinct symptoms of acid intoxication, two two days after operation and one four days after operation. They all had considerable acetone and diacetic acid in the urine, developed a strong, sweet odor to the breath, became restless and delirious, vomited persistently, followed by coma and death. Treatment apparently had no effect on their condition.

The cleft palate showed but slight amount of acetone until just before death, when there was a large quantity excreted. One of the cases of intestinal obstruction, however, showed a strong acetone breath, and at autopsy there was a strong odor of acetone noted when the intestines were opened. This child, a girl aged four, died the day following operation. (See Tables V and VI.)

TABLE No. V.

Postoperative Cases Showing Occurrence of Apathy. Flushed Face, Acetone Breath, Restlessness, Vomiting.

| | No. | Apathy | Flushed face | Acetone breath | Restlessness | Vomiting | Death | Coma |
|---|---|---|---|---|---|---|---|---|
| Hernia | 23 | 23 | 13 | 8 | 9 | 4 | 3 | 2 |
| Knock-knees | 3 | 2 | 2 | 3 | 1 | .. | .. | |
| Bow-legs | 4 | .. | . | . | 1 | 1 | .. | .. |
| Hydrocele | 1 | 1 | .. | .. | .. | .. | .. | . |
| Club-foot | 1 | 1 | .. | .. | .. | .. | .. | .. |
| Inf. paralysis | 10 | 10 | 7 | 3 | 2 | 1 | 3 | 1 |
| Cerv. adenitis | 1 | 1 | 1 | 2 | 1 | .. | .. | . |
| Cleft palate | 2 | 2 | . | 1 | .. | 1 | 1 | . 1 |
| Osteomyelitis | 2 | 2 | 2 | .. | .. | 2 | | .. |
| Int. obst | 2 | 2 | .. | .. | 1 | 2 | 2 | .. |
| Cong. dis. hip | 2 | 2 | 1 | .. | 1 | .. | .. | .. |
| T. b. spine abscess | 1 | .. | .. | .. | . | 1 | 1 | .. |
| Appendix with peritonitis | 2 | .. | .. | .. | .. | 1 | 2 | .. |
| Chron. append | 1 | .. | .. | 1 | .. | 1 | .. | .. |
| Still's dis | 1 | .. | 1 | .. | .. | .. | .. | .. |
| Sarcoma kidney | 1 | .. | .. | .. | .. | . | 1 | .. |
| Brain tumor | 1 | 1 | .. | .. | .. | 1 | 1 | .. |
| Empyema | 1 | .. | .. | .. | .. | .. | 1 | . |
| T. b. hip | 1 | .. | .. | .. | .. | .. | 1 | .. |
| | 60 | 47 | 27 | 18 | 16 | 15 | 16 | 4 |

TABLE No. VI.

| Death | | Age |
|---|---|---|
| Brain tumor | One | 7 years. |
| Intestinal obstruction | Two | 4 months. |
| | | 4 years. |
| Hernia | Three | 2 years. |
| | | 3 years. |
| | | 2 years. |
| Appendicitis | Two | 9 years. |
| | | 3½ years. |
| Cleft palate | One | 17 months. |
| Infantile paralysis | Three | 5½ years. |
| T. b. spine | One | 5 years. |
| Empyema | One | 4 years. |
| T. b. hip | One | 1 year. |
| Sarcoma of kidney | One | 8 years. |

*Comparison of qualitative tests to quantitative tests.*

By comparing the figures we obtained in the quantitative examination for acetone with the standards—"considerable," "moderate" or "trace"—which we established in using the qualitative tests, we found that these latter are very inaccurate and give no true idea as to the amount of acetone being excreted. The variation is marked in all cases; for instance, where a case was excreting 55.64 mgm. to 20 c.c. of urine, the report by the qualitative method would be "moderate"; and in others where 20 mgm. was being excreted the report would be a "trace," or absent. This depends somewhat on the technic and the observer, but on the whole is most inaccurate and misleading. Even the control of the diacetic acid test failed.

To get an accurate idea of how much acetone is being excreted in a given case the urine must be examined quantitatively.

(*k*) *Treatment.*

The routine treatment has been to diminish and remove if possible the condition of acid intoxication. This is naturally done by giving an alkali, preferably sodium bicarbonate, in doses of 10 grains each at about two hours' interval. This has been pushed so that patients often take 30 grains every four hours. However, the tolerance of the stomach to the soda is not great and these procedures often cause vomiting or accentuate it if it already exists, so that it often has to be given by rectum.

If the condition is severe, stimulation by means of alcohol, saline infusion subcutaneously or by rectum, combined with adrenalin in 1–50,000 solution every four hours is given. The skin must also be made to act freely by hot-air baths. The bowels in all cases must be kept freely open, although in one case acetone persisted during a period of gastroenteritis, and stopped as soon as this condition cleared up.

Quoting from Folin in regard to the alkali therapy, he states: "The administration of sodic carbonate in cases of acidosis has been advocated and tried, consistently and extensively, for the last fifteen years, yet it has hardly been so successful as one would have reason to expect if acidosis were the primary cause of

diabetic coma. As a remedial measure, after the onset of coma, it seems to have been practically abandoned.

"Exponents of the acid intoxication theory claim, to be sure, greater success for the sodic carbonate treatment than is now conceded by men like v. Noorden, but they have also been compelled to explain its shortcomings. Naunyn's explanation is that, on the one hand, too much damage may have been done by the acetone bodies in the early stages of acidosis and that, on the other hand, the sodic carbonate does not reach the tissues where the acetone bodies are formed and where the damage is done.

"Since the alkali therapy must after all furnish the final practical proof of the validity of the acid intoxication theory, this phase of the problem ought, it seems to me, to receive more attention than it has yet received from the exponents of that theory. The use of sodic carbonate alone is not in accordance with current teachings of physiology. The superiority of salt mixtures as against any one salt in maintaining the living tissues intact has been abundantly demonstrated. The toxicity of pure sodium chlorid, as shown by Löb, the superiority of Ringer's solution to 'normal salt solution' and a number of other well ascertained facts clearly indicate that the flooding of a patient with sodium might in itself be injurious or at least less promising than the use of an equivalent mixture of sodium, potassium, calcium and magnesium.

"Moreover, since the greatest skill is required to furnish patients with sufficient food and since the blood of these patients shows a diminished capacity for transporting carbon dioxid, it would seem that the useless and burdensome carbonic acid of the carbonates should be replaced by organic acids having some fuel value. The prospect of finding a variety of organic acids the salts of which would be suitable for this purpose is now, of course, greatly increased by the investigations of Knoop, Embden and Blum and Baer, which have already been mentioned.

"Aside from the food value of such salts of organic acids, there is another and far more important reason why they should be tried on a large scale. From the fact that these salts are foods there is every reason to believe that they, like other food, should

penetrate to every part of every tissue just as the precursors of the oxybutyric acid are supposed to do.

"Through the oxidation of these acids the oxybutyric acid formations should tend to diminish and whatever oxybutyric acid did form would, or should, be neutralized in the very cells where it originates—a result confessedly not attained by the sodic carbonate treatment."

## Description of Charts.

Figures at left of chart represent number of mgm. of acetone in 20 c.c. of urine, as equivalent to 1 c.c. to $\frac{10}{N}$ iodine solution.

Each large square represents two six-hour periods, being divided by the middle line. The figures on the charts at the points represent the number of mgm. of acetone. Op. represents the operation.

Figures below represent the 6° periods by number in order.

These figures show not the actual amount of acetone alone, but acetone in combination with diacetic acid. The acetone values vary from about one-third to less than one-tenth of the total values given by the Messenger-Huppert method, which test gives the sum of the two products. The so-called quantitative tests for acetone are really tests for diacetic acid, except when the air-current method of acetone determination of Folin's is used in conjunction with the above-mentioned Messenger-Huppert test.

I wish here to express my thanks to Dr. Folin and his assistant, Dr. Blanck, of the Harvard Medical School, Department of Biological Chemistry, for their interest in this work and their painstaking analysis which have involved necessarily much time and effort and also to thank Dr. Folin for his criticism of this paper.

As a result of these investigations we have arrived at certain facts, and although we have perhaps not established any hard and fast lines as to the cause of acetone formation, we can draw certain deductions from such a large series of cases, which are of distinct interest and which have been noted above.

It is the hope of the writer to continue this investigation along

certain lines more carefully, with the idea of throwing more light on this little understood subject.

Case I.—Shock. Boy, age 9, left inguinal hernia.

Entered hospital January 22, 1908. G. C. good. Urine examined January 22: acetone, 0; diacetic, 0.

Operation radical one, January 27, 1908. Ether anesthesia.

Amount used, 3 oz.

Duration, forty-five minutes.

Drop method.

No vomiting after admission before operation. Ether breakfast: rice gruel, 8 oz. at 8 A.M. Diet before operation, house.

Occurrence of acetone, January 28, 1908. Disappearance of acetone, February 1, 1908. No fright before operation. Knowledge of operation, yes. General symptoms, none.

No acetone, by breath absorption test, January 23, 1908.

Acetone trace by breath absorption test, January 27, 1908.

Treatment: Sod. bicarb. gr. xx, every two hours. Discharged well after uneventful convalescence. February 10, 1908. No elevation of temperature.

Bowels did not move day after operation, but daily after that except on fourth day. Diet, see chart. In periods ii, iv and xvi no urine was passed. Between periods v and ix the urine was lost, as was also the case between periods x and xiv.

Case II.—Girl, age 7, double inguinal hernia.

Entered hospital, January 13, 1908. Urine examined, January 14, 1908, in A.M. No acetone or diacetic. G. C. fair.

Operation, January 14, '08, at 11.50 A.M.

Duration, one hour.

Ether anesthesia.

Amount used, 6 oz.

Diet before, house. Occurrence of acetone, January 15. Disappearance of diacetic acid, January 17. General symptoms, none. No treatment.

Diet, see chart. Fright, 0. Knowledge of operation, 0.

Temperature day after operation 101.2; then normal. No vomiting at any time. Bowels moved daily. No urine passed in period iii.

TABLE VII.—CASE II.

| Date | J—, double hernia<br>Operation, Jan. 14, 11.50 A.M.<br>Duration, 1 hour<br>Ether, 6 oz. | 6-hour periods | Mg. M | Vol. | Total |
|---|---|---|---|---|---|
| Jan. 14 | 8.30 A.M., ether breakfast<br>10 A.M., milk 2 oz.<br><br>12 M., milk 1 oz. | | | | |
| Jan. 15 | 4 A.M., milk 2 oz.; 6 A.M., milk 3 oz. 8 A.M.; 10, 12, 4 oz.; 2 P.M., 2 oz. 4, 6, 8, P.M., 4 oz. | Jan. 15<br>5.30<br>11.30 | 39.76 | 110 | 218.68 |
| | 12 M., 4 oz.<br>Jan. 16, 4 A.M. milk 4 oz. | Jan. 15–16<br>11.30 P.M.<br>5.30 A.M. | 24.62 | 130 | 160.03 |
| Jan. 16 | 8 A.M., 4 oz.; 10 A.M., 4 oz. | | | | |
| | 2 P.M., 2 oz.; 4 P.M., 4 oz. | Jan. 16<br>11.30 A.M.<br>5.30 P.M. | 27.14 | 114 | 154.69 |
| | 6 P.M., 4 oz.; 8 P.M., 4 oz. | Jan. 16<br>5.30 P.M.<br><br>11.30 P.M | 5.76 | 82 | 23.61 |

CASE III.—Boy, age 4, knock-knees.

Admitted, February 3, 1908. General condition good. Urine, February 4, 1908 acetone +, diacetic +; February 8: acetone, 0; diacetic, 0.

Operation, February 4, 10.15 A. M. Double McEwen, osteotomy. Ether anesthesia.

Amount, 3 oz.

Duration, thirty minutes.

Cone method.

No vomiting at any time. Ether breakfast, 7 A.M., rice gruel 8 oz. Knowledge of operation, no. Fright, no. Time waiting to be operated on, twenty minutes.

General symptoms: slightly apathetic, flushed face, did not sleep well for two nights following operation. No breath.

Sodii Bicarb. gr. XX every two hours.

Occurrence of acetone, February 4. Disappearance of acetone, February 8.

Food, see chart. Bowels moved daily. Temperature, 101.2 second night after operation. Then dropped to normal.

Diacetic acid, February 4 +. Diacetic acid, February 8, 0.

During periods ii, iv, and ix no urine voided.

TABLE VIII.—CASE III.

| Date | G—. Male, 4 years. Knock-knees. Operation, Feb. 4, 10.15 A. M. Duration, 15 min. Ether, 3 oz. | 6-hour periods | Mg. M | Vol | Total |
|---|---|---|---|---|---|
| Feb. 4 | 5 P.M., milk, ¼ L. W., 2 oz.<br>11 P. M., milk, ¼ L. W., 4 oz. | Feb. 4<br>6 P.M.<br>12 M. | 45.86 | 20 | 45.86 |
| Feb. 5 | 4 A.M., milk 4 oz.<br>8 A.M., milk 4 oz., 1 saucer cereal, 1 bread.<br>12 M., milk 5 oz. | Feb. 5<br>6 A.M.<br>12 M. | 34.90 | 50 | 87.25 |
| | 5 P.M., 1 slice bread, 4 oz. milk<br>10 P.M., milk.<br>12 M., milk. | Feb. 5<br>6 P.M.<br>12 M. | 37.16 | 44 | 81.75 |
| Feb. 6 | 2 A.M., milk 4 oz. | Feb. 6<br>12 M.<br>6 A.M. | 9.66 | 54 | 26.08 |
| | 8 A M., 1 slice bread, 2 oz. milk<br>12 M., 3 slices bread, 4 oz. milk. | Feb. 6<br>6 A.M.<br>12 M. | 36.86 | 87 | 0160.34 |
| | 5 P.M., 2 slices bread, 8 oz. milk | Feb. 6<br>12 M.<br>6 P.M. | 38.66 | 90 | 173.97 |
| | 12 M., milk 4 oz. | Interval 12 hours. | | | |
| Feb. 7 | 8 A.M., 2 slices bread, milk 8 oz. | Feb. 7<br>6 A.M.<br>12 M. | 16.84 | 78 | 65.67 |
| | 3 P.M., milk 4 oz.<br>5 P.M., saucer prunes, 2 slices bread, 4 oz. milk. | Feb. 7<br>12 M.<br>6 P.M. | 17.2 | 74 | 63.64 |
| | | Feb. 7<br>6 P.M.<br>12 M. | 2.16 | 53 | 5.72 |
| | 6 A.M., milk 4 oz. | Feb. 8<br>12 M.<br>6 A.M. | 2.06 | 79 | 8.13 |
| | 8 A.M., 1 saucer oatmeal, 1 slice bread, milk 4 oz. | Feb. 8<br>6 A.M. | 2.48 | 74 | 9.17 |

CASE IV.—Boy, age 7. Congenital club-foot.

Admitted January 16, 1908. General condition good. Diet before operation, house diet. Took it well. Operation, January 21, 1908. Tenotomies. Ether anesthesia; amount, 5 oz. Duration, forty min. No vomiting before or after operation.

No symptoms. Acetone not smelt on breath, but detected in urine plainly on January 22 and January 23. Acetone before operation occurred on January 17, slight trace; diacetic acid, 0. After operation:

January 22, acetone moderate, diacetic 0.
January 23, acetone moderate, diacetic +.
January 25, acetone 0, diacetic 0.

TABLE IX.—CASE IV.

| Date | C—, Male, 7 years. Congenital Club-foot<br>Operation, Jan. 21<br>Duration, 40 min. Ether, 5 oz. | 6-hour periods | Mg.MS | Vol. | Total |
|---|---|---|---|---|---|
| Jan. 20 | 7 A.M., crackers & milk (1 cup), bread and butter 2 slices, 12 M., meat, potato, bread pudding, cookies, milk, ½ banana. 3 P. M. ice cream.<br>5 P.M., bread and butter, apple sauce, milk. | | | | |
| Jan. 21 | 5.30 A.M., rice gruel, 8 oz.<br>5 P.M., 2 oz. ¼ L. W.<br>9 P.M., 4 oz. ¼ L. W. | Jan. 21<br>5 P.M.<br>11 P.M. | 29.00 | 195 | 282.75 |
| Jan. 22 | 2 A.M., 4 oz., ¼ L. W. | Jan. 21–22<br>11 P.M.<br>5 A.M. | 12.64 | 254 | 160.52 |
| | 6.30 A.M., milk, ¼ L. W., 4 oz.<br>10 A.M., milk, ¼ L. W., 6 oz.<br>XX gr. $NaHCo_2$ at 10 A.M. | Jan. 22<br>5 A.M.<br>11 A.M. | 20.50 | 177 | 177. |
| | 12 M., milk, ¼ L. W., 4 oz.<br>3 P.M., milk, ¼ L. W., 4 oz.<br>12 M., XX gr. $NaHCo_2$ | | | | |
| | 2 P.M., 15 gr. $NaHCo_2$.<br>4 P.M., 15 gr. $NaHCo_2$. | | | | |
| Jan. 23 | 7 A.M., milk toast 1 slice, crackers and milk 1 cup. | Jan. 23<br>5 A.M.<br>11 A.M. | 41.78 | 165 | 264.68 |
| | 12 M., meat, potato, bread pudding, ½ apple, few grapes. 3 P.M. ice cream, vanilla. | Jan. 23<br>11 A.M.<br>5 P.M. | 34.90 | 180 | 314.10 |
| | 5 P.M., bread and molasses and milk. | | | | |
| Jan. 24 | 7 A.M., 1 cup bread and milk. | Jan. 24<br>5 A.M.<br>11 A.M. | 1.89 | 127 | 11.90 |
| | | Jan. 24–25<br>11 P.M.<br>5 A.M. | .68 | 127 | 4.28 |

Case V.—Boy, age 5. Cleft palate.

Entered hospital February 1, 1908. Well developed and nourished.

Operation, February 10, 1908. Plastic on palate.

Amount of ether, 12 oz.

Duration, 1° 15″.

Spray.

February 8, acetone 0.

February 10, acetone trace, diacetic acid 0.

February 12, acetone moderate, diacetic acid moderate.

February 13, acetone +, diacetic acid moderate.

February 14, acetone moderate, diacetic acid moderate.

February 15, acetone moderate, diaceticacid moderate.

February 17, acetone moderate, diacetic acid moderate.

February 18, acetone trace, diacetic acid moderate.

February 19, acetone trace, diacetic acid trace.

February 20, acetone trace, diacetic acid trace.

February 21, acetone trace, diacetic acid 0.

February 22, acetone 0, diacetic acid 0.

No symptoms, up and about, no temperature. Bowels regular. Ether breakfast, rice gruel 4 oz. at 8 A. M. Operation at 12 M. Diet, liquids. In bed one week, then up and about.

Acetone persisted twelve days. Knowledge of operation, 9. Fright, 0.

Treatment: Sodium bicarb. gr. XX every two hours. During periods XI, XV, XXVI, and XXX no urine was passed. The specimens in periods XIX and XX were lost, representing in this case 24°.

TABLE X.—CASE V.

| Date | B—, Male, 5 years. Cleft palate. Operation, Feb. 10, 11.58 Duration, 1 hour 14 minutes. Ether, 12 oz. | 6-hour Periods | Mg.M | Vol. | Total |
|---|---|---|---|---|---|
| Feb. 9 | 12 M., 1 plate meat & potatoes, 1 slice bread.<br>3 P.M., milk 8 oz., 1 saucer prunes, 2 slices bread.<br>5 P.M., milk 8 oz. | | | | |
| Feb. 10 | 7 A.M. rice gruel 4 oz. | | | | |
| Feb. 11 | Milk with ¼ L. W. 1 oz. 8 A.M., 9, 9.30, 10, 11, 12, 12.30. | Feb. 11<br>8 A.M.<br>2 P.M. | 33.92 | 110 | 186.56 |

TABLE X.—CASE V.—*Continued.*

| Date | | 6 Hour Periods | Mg. MS | Vol. | Total |
|---|---|---|---|---|---|
| | 5 P.M., 3 oz. milk ¼ L. W. | Feb. 11<br>2 P.M.<br>8 P.M. | 37.02 | 92 | 170.29 |
| Feb. 12 | 8 A.M., milk 4 oz. | Feb. 11–12<br>8 P.M.<br>2 A.M. | 33.80 | 77 | 130.13 |
| | 10 A.M., milk 3 oz. | Feb. 12<br>2 A.M.<br>8 A.M. | 51.52 | 106 | 273.05 |
| | 12 M., milk 4 oz. | Feb. 12<br>8 A.M.<br>2 P.M. | 43.02 | 98 | 210.79 |
| | 3 P.M., milk 5 oz.<br>5 P.M., milk 4 oz. | Feb. 12<br>2 P.M.<br>8 P.M. | 42.22 | 109 | 232.09 |
| | | Feb. 12–13<br>8 P.M.<br>2 A.M. | 16.70 | 184 | 153.64 |
| Feb. 13 | 5 A.M., milk 4 oz.<br>8 A.M., milk 4 oz. | Feb. 13<br>2 A.M.<br>8 A.M. | 27.16 | 103 | 139.87 |
| | 10 A.M., milk 3 oz.<br>12 M., eggnog 6 oz. | Feb. 13<br>8 A.M.<br>2 P.M. | 46.04 | 99 | 458.09 |
| | 3 P.M., milk 4 oz.<br>5 P.M., milk 5 oz.<br>10 P.M., milk 4 oz. | Feb. 13<br>2 P.M.<br>8 P.M. | 32.88 | 110 | 227.89 |
| Feb. 14 | 8 A.M., milk 6 oz. | Feb. 14<br>2 A.M.<br>8 A.M. | 10.18 | 89 | 45.30 |
| Feb. 14 | 10 A.M., milk 6 oz.<br>12 M., beef broth 8 oz. | Feb. 14<br>8 A.M.<br>2 P.M. | 44.96 | 80 | 179.84 |
| | 3 P.M., milk 5 oz.<br>5 P.M., milk 8 oz. | Feb. 14<br>2 P.M.<br>8 P.M. | 51.6 | 101 | 260.58 |
| Feb. 15 | 8 A.M., eggnog 8 oz. | Feb. 15<br>2 A.M.<br>8 A.M. | 42.24 | 108 | 228.09 |
| | 12 M., milk 4 oz. | Feb. 15<br>8 A.M.<br>2 P.M. | 55.64 | 104 | 289.32 |

TABLE X.—CASE V.—*Continued.*

| Date | | 6 Hour Periods | Mg. MS | Vol. | Total |
|---|---|---|---|---|---|
| | 3 P.M., milk 4 oz.<br>5 P.M., milk 8 oz. | Feb. 15<br>2 P.M.<br>8 P.M. | 29.84 | 110 | 164.12 |
| Feb. 16 | 8 A.M., eggnog 4 oz.<br>12 M., beef broth 5 oz. | Interval 24 | hours. | | |
| | 5 P.M., ice cream 1 tablespoonful, milk 8 oz. | Feb. 16<br>2 P.M.<br>8 P.M. | 22.56 | 140 | 157.92 |
| Feb. 17 | 8 A.M., milk 8 oz. | Feb. 17<br>2 A.M.<br>8 A.M. | 20.44 | 116 | 118.55 |
| | 10 A.M., milk, 3 oz.<br>12 M., eggnog 8 oz. | Feb. 17<br>8 A.M.<br>2 P.M. | 40.88 | 128 | 261.63 |
| | 3 P.M., ice cream 1 saucer<br>5 P.M., chicken broth 8 oz.<br>8 P.M., milk 4 oz. | Feb. 15<br>2 P.M.<br>8 P.M. | 10.18 | 122 | 62.09 |
| | | Feb. 17–18<br>8 P.M.<br>2 A.M. | 4.45 | 310 | 68.97 |

CASE VI.—Boy, age 2 years. Right inguinal hernia.

Entered hospital January 27, 1908. General condition good.

Operation, January 29, 1908, at 11.40 A.M.

Urine, January 28, acetone 0, diacetic acid 0.
January 29, acetone 0, diacetic acid 0.
January 30, acetone moderate, diacetic acid sl. trace.
February 1, acetone moderate, diacetic acid moderate.
February 3, acetone 0.
February 12, acetone 0.

February 2. No vomiting, taking food well. Five days after operation temperature went to 103.8 and dropped to normal in 24°. No cause.

Bowels regular.

Ether used, 4 oz. Duration, forty-eight minutes.

Ether breakfast, rice gruel 8 oz. at 8 A.M. Following operation child was slightly apathetic during the first twenty-four hours.

CASE VII.—Boy, age 11. Double inguinal hernia. Entered hospital January 9, 1908. General condition good.

Urine, January 10, acetone 0.
January 12, acetone +, diacetic acid 0.
January 13, acetone 0, diacetic acid 0.
January 14, acetone trace, diacetic acid 0.
January 15, acetone trace, diacetic acid +.
January 16, acetone trace, diacetic acid 0.
January 18, acetone 0, diacetic acid 0.

January 15, temperature in A.M. normal; in P.M. 100° F.

Dressed. January 16, A.M., 101.2; P.M., 100.

January 17, normal.

Bowels regular. Discharged, January 22, 1908.

Operation, January 11 at 11.55 A.M. Double herniotomy.

Ether used, 3 oz. Duration, forty-five minutes.

House diet before operation. Ether breakfast, boullion 6 oz. at 6.30 A.M.

Symptoms: apathetic and drowsy for first two days after operation. No vomiting. Sodium Bicarb. gr. XX every two hours.

CASE VIII.—Boy, age 7. Tonsillitis and cervical adenitis.

Entered hospital January 9, 1908.

Operation, January 11, 1908. Dissection of neck. Sick three weeks with grip. Mass in neck, followed by sore throat at that time. General condition, fair. Stitches sloughed, edges of wound separated, considerable discharge.

January 22, sent to convalescent home with discharging wound.

Urine, January 10, acetone 0.
January 11, acetone trace.
January 12, acetone trace.
January 14, acetone 0.
January 15, acetone 0.

No temperature or vomiting; daily dressing after sixth day. First dressing on fourth day. Bowels regular.

Operation, January 11. Dissection of neck, 12.10 P.M. Ether, 5 oz. Duration, fifty-five minutes.

Ether breakfast, bouillon 6 oz. at 7 A.M. Diet before operation, house diet. No symptoms.

Sodium Bicarb. gr. XX every two hours.

Acetone occurred before operation in one specimen which showed 16.42 to 20 c.c.

CASE IX.—Girl, age 10. Congenital dislocation of hip.

Entered, January 28, 1908. General condition good.

Operation, January 31, 1908, 9.30 A.M.

Ether, 4 oz.

Duration, one hour fifteen minutes.

Drop method.

Duration of acetone, three days. Ether breakfast, rice gruel 2 oz. at 6.15 A.M.

No vomiting, no symptoms. No treatment.

Urine from period ii to Period vii lost. No urine voided in periods viii or x. Bowels regular daily.

CASE X.—Boy, age 11. Acute appendix.

Entered, January 29, 1908. General condition poor.

Operation, January 29, appendectomy.

Ether, 4½ oz. Duration, forty minutes.

History: sick nine days with pain in feet and ankles, feverish, swollen joints, "stomachache," on fourth day, and vomited on fourth and sixth days. Pain in abdomen has been constant. No vomiting after operation.

Urine, January 30, acetone considerable, diacetic acid moderate.
January 31, acetone diacetic acid 0.
February 1, acetone trace, diacetic acid trace.
February 2, acetone considerable, diacetic acid trace.
February 3, acetone trace, diacetic acid 0.

White count, 18,000, January 29. Daily dressing. Daily enema. Temperature fell by lysis to normal in 4 days. Considerable discharge from wound.

No acetone symptoms, except slight apathy day after operation.

CASE XI.—Boy, age 4 years. Left inguinal hernia.

Entered hospital, January 22, 1908. General condition good. House diet.

Operation, January 24, 1908, 11.30 A.M. Herniotomy. Duration, fifty minutes. Ether, 5 oz.

No acetone before operation. Ether breakfast, bouillon 4 oz. at 7 A.M. and rice gruel 1 oz. at 8.30 A.M.

Vomiting morning after operation at 2.30 and 7.30 A.M. Acetone duration, five days. No knowledge of operation or fright.

Symptoms, slight dullness and apathy first day after operation. Temperature not elevated. Bowels regular.

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## IV.

# SOME NOTES ON ANKYLOSIS OF THE KNEE.*

BY

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I regret that I am unable to show myself worthy of the honor of addressing the members of the A. O. A. by propounding any new method of treatment for ankylosis, but I am happy to offer the results of a good many years' experience as surgeon to the National and Royal National Orthopedic Hospitals in London.

During the last twenty-five years the cases which I have treated have not been very numerous, and this is due not, unfortunately, to the rarity of stiff knee, but, as I believe, to the reluctance of sufferers to submit to operation.

As surgeon to the Surgical Aid Society I have seen in the last thirteen years a very large number of cases of ankylosis in a bad position, but very few, indeed, were willing to allow anything further to be done, although promised that their high boots would be lowered enormously and their lameness almost or quite abolished. These cases have generally had a long experience of hospitals, and although the knee may be fixed at a right angle and a boot with 7 or 8 inches of cork be necessary with its accompanying insecurity of gait, yet the present painless condition is so much better than that in which they were while active trouble was going on that they "had rather bear the ills they have than fly to others that they know not of," especially as the sojourn in hospital necessary to obtain a straight limb would probably involve loss of their employment.

As I have had no experience in the use of gold foil or muscle or fat or fibrous-tissue flaps, as means of preventing adhesion between the bone ends, or of Weglowski's transplantations of rib-

*Read before the American Orthopedic Association at Chicago, June, 1908.

cartilage, I cannot discuss these devices profitably, but I venture to question their usefulness in such a joint as the knee.

Strictly speaking, ankylosis, or stiff joint, includes all cases in which the normal mobility of the joint is seriously impaired, but it is not usual to place under this heading such cases as often occur as a result of anterior poliomyelitis, in which the range of movement in one direction only is slightly diminished, as in the case of loss of power in the quadriceps extensor of the knee, where flexion is free and normal and only complete extension is impossible. Such cases are usually called "contracted knee" rather than stiff knee.

It has been usual to divide cases of ankylosis into bony and fibrous. This classification is no doubt anatomically correct, but from the therapeutic point of view it is not of much clinical significance. If the ankylosis is very firm the line of treatment to be followed depends not upon the nature of the resisting medium, but on the amount of motion possible under an anesthetic.

The writer would, therefore, prefer to classify cases as:

1. Firm or complete, allowing no perceptible movement.
2. Incomplete, allowing some obvious movement.

The distinction which is difficult in the case of the hip is easy to make in the case of the knee.

Clinically, this distinction is important, because if there is movement in the joint, it should be carefully conserved and attempts be made to straighten without risking opening the joint cavity and perhaps getting as a result a straight but stiff limb.

When the ankylosis is firm, however, whatever the nature of the uniting medium, there is no reason to avoid the site of the joint and a free anterior arthrotomy and, if necessary, a wedge-osteotomy offer the best prospect of improvement.

In the majority of cases of stiff knee the ankylosis is fibrous. Causes: Inflammation in or around the joint, abscess, trauma, rheumatism.

It is most often due to infection by a specific organism. The condition may vary from slight periarticular bands to obliteration of the cavity of the joint by fibrous tissue. Movement may be possible through a considerable angle, or there may be no per-

ceptible motion possible between the bones. The relative positions of the segments of the limb involved may be favorable to function or the reverse.

There may be secondary contractures of the muscles passing over the joint.

The treatment of ankylosis differs in its objects in the upper and in the lower limbs, for while in the former free mobility is the great desideratum, in the latter a firm support to the weight of the body is the thing wanted.

In the case of the knee, improvement of position is the chief object of treatment.

Attempts to reconstruct a joint, the ligaments of which have been destroyed are not very hopeful, especially in the knee, which depends for its security so much upon ligaments.

The condition of the patella as regards mobility is of considerable value in prognosis. When it is fixed in the condyles of the femur, the chance of success of mere manipulations is small and a cutting operation is nearly always necessary.

*Treatment.*—When there is a good deal of movement and no tendons are felt resisting correction, forcible correction of the deformity or gradual correction by splints, etc., may be tried before resorting to severer measures.

The following cases are examples of the successful use of these methods:

Leon E. Aged nine. Seen in 1891. Appears to have had osteitis of the left femur involving the joint. No history obtainable. The knee is contracted about 30°, and very little movement is possible. There is a large cicatrix about 5 to 6 inches above the left patella, to which the quadriceps extensor tendon is adherent. Under ether, the limb was forcibly straightened, and adhesions in the joint yielded, allowing the limb to be nearly straightened. Subsequently, ether was again administered, and the adhesions of the extensor muscles to the front of the femur torn through. As then straightened, the limb was found to be 3/4 inch longer than its fellow.

Amelia P. Aged twenty-seven. Seen in October, 1898. When fourteen years old she went into domestic service. Her

work was principally in a dark cellar-kitchen. When fifteen years of age she had rheumatism, and was for six months in bed. During convalescence she walked about the house a little, but soon lost the use of her legs from the contraction and flexion at the knees. She has had to be carried about ever since—about eleven years.

There is some deformity and contraction of the elbows, wrists and fingers, but these members are useful.

"The knees are generally kept flexed to a right angle. They can be flexed 45° from this position, and extended 30°, thus giving a range of movement of about 75° instead of the normal, 160°, or even 180°. The upper (articular) surfaces of the tibiæ rest on the back of the condyles of the femora. The legs are rotated outward on the thighs. The patellæ are consequently displaced outward, but not completely dislocated. The capsule and ligaments appear to be lax and the synovial cavity somewhat distended. On movement, a rubbing or grating sensation is communicated to the hand, as though the joint cartilage was roughened."

Macintyre's splints were applied, and the limbs gradually extended by means of the screw. After six weeks the left limb was straight and the right was straightened soon after. Four months afterward she left the hospital, walking after eleven years' abeyance of the power of locomotion and wearing walking braces extending to the thighs.

This case was probably one of mixed infection, but in the absence of exact history this point cannot be decided.

If no movement in the joint is possible, an X-ray picture should be taken. If this shows that the ankylosis is bony, anterior arthrotomy (if such a term may be used when there is no joint) should be at once performed, for there is no use in trying any lesser measure.

Should the radiogram negative this diagnosis, the method to be followed will depend on the result of an examination under an anesthetic. This has been the writer's routine treatment in all cases which are not obviously bony. If forcible manipulations fail, but the tendons and fascia in the ham and at the sides

of the joint appear to resist correction, these should be divided. An open V-shaped incision gives good access to the parts, and after isolating the large nerve-trunks, all tendons and bands of fascia and muscles are to be divided, avoiding, of course, the great vessels. If there be hope of a movable joint, the tendons should be divided by Anderson's Z method and elongated and sutured. The V-incision being then so united as to convert it into a Y, the skin will be elongated sufficiently to allow of straightening.

Should it still be impossible to correct the deformity, and should there not be enough mobility to be worth conserving, an anterior operation should be performed as soon as the wound in the ham is firmly healed.

If, on the other hand, it is desirable to preserve the movable joint such as it is, an osteotomy of the shaft of the femur just above the condyles (known as Ollier's operation) offers to my mind the best prospect of success.

All three methods were employed in the following case:

Edward Berry, aged forty-six. Seen in 1899. Thinks he had rheumatic fever when a child. Has suffered from rheumatism for ten years, and for the last six years has been unable to walk. Both knees are contracted and held at a right angle. They permit of slight flexion beyond this, but of no further extension. The muscles of the thighs and legs are wasted. The shoulders, elbows and wrists are also affected. The iliotibial bands—biceps tendons—were subcutaneously divided, but as only slight improvement followed after the use of splints for six weeks, a V-shaped incision was made in the right ham, and all the hamstrings and tight bands of fascia were divided and the limb straightened as far as possible and placed on a back splint. The left knee was attacked from in front, and a wedge including the ends of the tibia and of the femur and the intervening fibrous tissue was removed. The cancellous tissue of both bones was extremely soft and would not hold a suture. The limb was fixed on full extension on a back splint.

As the result of the operation on the right knee was not satisfactory and the continuity and circulation of the ham being fully restored, but there remaining still a considerable amount of flex-

ion deformity, a linear longitudinal incision was made just above the patella and the front of the shaft of the femur exposed. A wedge, base in front, was removed from the bone two and one-half inches above the joint and the limb straightened. The cancellous tissue was very fatty. Eight weeks afterward he was discharged, walking with the help of crutches. The left limb was one-half inch shorter than the right.

The writer would avoid doing a free excision of bone in patients under fourteen years of age, and after that age the epiphyreal lines should, of course, be respected if the patient is under twenty-one. He has not found pins, nails, screws, or wires necessary in the case of the knee, even when the condition of the bone would admit of their use.

V.

# WHEN IS BONY UNION COMPLETE AFTER EXCISION OF THE KNEE-JOINT?*

BY J. TORRANCE RUGH, M. D., PHILADELPHIA.

An extended review of the literature regarding the results of excision of the knee-joint shows conclusively that flexion deformity is extremely probable in children prior to ten or twelve years of age and that after this period it becomes progressively less with increasing age. While Sherman showed in a paper before this association that when flexion occurred, it was not always at the line of junction of the excised parts, but might be in the line between the epiphysis and the bony shaft (this occurred in one of my cases to be mentioned later), we believe the primary proposition that when the bony union is complete, flexion or other deformity does not occur, will be conceded by all observers. The difficulty surrounding these cases lies in the knowing when the permanent bony callus has been deposited and solid union is complete. That there is marked diversity of opinion on the part of writers and observers is shown by the instructions and statements as to the length of time fixation must be maintained after the operation has been performed.

Ashhurst (Encyclopedia of Surgery, Vol. IV, p. 509) cites two cases in which "the bones were to all appearances finally united," but in which flexion took place, and in one of them after seven years had passed; this case required "excision in a block" (Buck's method).

Bradford and Lovett (Orthopedic Surgery, 1905, p. 166) declare "ankylosis is to be hoped for after excision and is complicated by the tendency to flexion of the apparently ankylosed joint" . . . (*id.*, p. 168), "A protection splint is to be worn for some time to

*Read before the American Orthopedic Association at Chicago, June 1908.

prevent the recurrence of flexion. . . . It is much the wiser course to have the patient wear a perineal crutch (in the form of a Thomas knee splint) which shall prevent bearing any weight on the leg until several months after operation."

Von Bergman's System of Surgery (Vol. III, p. 615), says, "If recovery is uneventful, the splint is left on for three weeks. . . . A flexion contraction is possible if the ankylosis is not bony, but cartilaginous or fibrous, cartilaginous union occurring in younger patients if the cartilage is preserved, fibrous if cavities are chiseled out in the bone or suppuration occurs."

Dacosta (Modern Surgery, 1903, p. 345), says "The splint is kept on until bony union is complete, as in this operation a movable joint is never sought. Many surgeons use a plaster-of-Paris splint which is employed until the parts have become firm and solid."

The American Text-book of Surgery, p. 1133, directs that immobilization should be maintained for two or, better, three months and a posterior splint should be worn for as many months longer that firm union in the position of nearly full extension may be secured.

J. B. Roberts (Modern Surgery, p. 524) says, "If the case is successful—that is, bony union and ankylosis are secured—the patient may be allowed to walk in from eight to ten weeks. No brace will be required unless bony ankylosis does not occur."

L. A. Sayre (Orthopedic Surgery and Diseases of Joints, 1883, p. 233) says, "All that is necessary when these indications (excision) are fully met, is to retain the limb in the condition of absolute rest until perfect consolidation had taken place."

Moore (Orthopedic Surgery, p. 295) deals with it in a similar manner. "The limb should be protected by a case until it is perfectly solid and early walking upon it should not be encouraged."

Thorndike (Orthopedic Surgery, 1907, p. 260) says, "Ankylosis is the aim of the operation, but it is not always attained and there is a tendency to flex in some even where ankylosis has apparently been secured."

Hoffa (Orthopædische Chirurgie) advises fixed dressings of plas-

ter or silicate of soda until healing has occurred and then "These supports must be worn for at least one year after the operation in order to prevent a new angular deformity of the joint. This tendency to deformity may also be overcome by prophylactic transplantation of the flexor muscles to the extensors (Heusner)."

A. J. Steele (Trans. Amer. Orthop. Assoc., Vol. I, p. 190) directs that "the splint had best be worn for many months, as there is a tendency to flexion, probably due to the hamstrings which, as the patient walks contract."

W. O. Plimpton (Trans. Amer. Orth. Assoc., Vol. VIII, p. 201) in report of cases, says, "Bony ankylosis resulted in four months to one year."

This variation in opinions of reporters indicates that there are conditions present in the individual cases or in this class of cases which materially modify the proliferation of bony tissue in epiphyseal structures and a brief inquiry into these will aid in explaining the lack of uniformity in the teaching respecting this condition. The observation of Hamilton (Fractures and Dislocations) that "In general, the bones of the lower extremities, independently of their size, unite more slowly than the bones of the upper extremities" is of clinical importance and offers at once a partial explanation of the delay. In some instances, the deductions of the old clinicians have proven of greater importance than investigations of the modern laboratory workers. Another clinical explanation is offered by Schapps (Trans. Amer. Orth. Assoc., Vol. IV) to the effect that "Callus from cancellous tissue is always softer or slower to ossify than that from hard bone and that new tissue is rendered softer by adjacent disease and incomplete removal."

The interest of the writer in this subject was first stimulated by observations upon three cases of secondary excision of the knee-joint done at various times.

The conditions then noted were at variance with the accepted teachings and caused a change in belief regarding what had been previously held. The ages of these patients were eight, seventeen and twenty-three years, respectively, and primary excision had been done in each for tubercular arthritis. In the first case, the

secondary operation was done two years after the primary because of spread of the disease and firm fibrous union was found between the epiphyses, though both of these parts were extensively involved in the diseased process. The affected portions were removed carefully to avoid injuring the epiphyseal lines and a silver-wire suture was used to hold the bones in apposition. The wound did badly and the disease was rapidly progressing, when the patient was sent to Atlantic City. The effect of the change of climate was quickly manifest and local recovery set in with improvement in the general health. She wore a brace for two years and at the end of two and one-half years had discarded it, when contraction deformity began. An X-ray made at this time, showed bony union between the epiphyses and flexion taking place between the epiphysis and the diaphysis of the femur, because of slight but evident disease activity in that portion. It also revealed growth on the part of the epiphyses inasmuch as the wire suture introduced two and one-half years previously had been broken and the ends quite widely separated. The brace was reapplied and the leg gradually straightened by the posterior screw.

In the seventeen-year-old case the secondary operation was done one year and ten months after the primary on account of flexion deformity and evidence of activity of the tubercular process. There were pain and swelling in the ankylosed knee and increasing deformity. Operation revealed fibrous ankylosis between the bone ends, and through it a knife could easily be thrust at any part. This case developed extensive venous thrombosis and embolus of the plantar artery with gangrene of one-third of the foot, secondary hemorrhages and abscesses of the calf and thigh muscles. Recovery finally took place, and three years later a skiagram showed solid bony union between the bone ends. How long this had been complete is uncertain, but his brace had not been worn after two years had passed and there has been no recurrence of deformity.

In the twenty-three-year-old case, the secondary operation was done two years and three months after the primary because of several discharging sinuses. There were found slight bony deposits about the periphery of the united bone ends, but none

within. In this case, amputation was strongly urged by a very eminent general surgeon, but careful cleaning out of the diseased part was followed by entire recovery and the patient has been in excellent health for many years. An X-ray was not taken in this case, but deformity has not occurred and it seems reasonable to suppose that bony union has been complete. In all these cases sinuses persisted during the interval of the operations, and in the first two for two years after the second operation, and we shall speak of the importance of this point a little later.

In the Univ. of Penna. Med. Bull., September, October and November, 1907, Dr. Henry S. Wieder published a very elaborate series of experiments upon some of the lower animals as to the regeneration of bone after fractures, complete and partial, and the results of his exhaustive studies throw considerable light upon the process of repair in bone and the time necessary to its completion. In the shaft of bones, "The periosteum, cortex, endosteum, and marrow assist in the process" of regeneration, but at various periods one is more active than the other. For instance, in the earlier periods, the marrow, endosteum and periosteum are most active in throwing out provisional callus, while later the cortex is most active in depositing permanent callus. Between the fractured bone ends there is always formed a ring of cartilage which with the provisional callus affords moderately firm fixation and which later assists in the deposit of the permanent callus that finally completes the process of union. The histology of the epiphysis of a long bone differs somewhat from that of the diaphysis and furnishes some very cogent reasons for the retarded union of these parts. In the first place, the endosteum, one of the most active callus-forming structures, is absent from the epiphysis (Stöhr's Text-book of Histology by Lewis), so that this part is at once deprived of a structure which Wieder and others have shown to be most important in the regenerative process. Again, the epiphysis in early life is composed of hyaline cartilage which at various times or periods is invaded by osteogenic tissue and is gradually replaced by bone. This spongy epiphysis does not become a part of the shaft until the subject is from eighteen to twenty-two years of age and the fact that the periosteum and the

cortex are the main bone-forming elements in this portion provides a very evident reason for this delay. The reconstructive power of the cortex is much slower than that of the other elements and its porosity being very much greater in the epiphysis than in the shaft, renders it still less active than described in Wieder's experiments. The latter also showed that the extensive destruction of the periosteum by the traumatism of the operation interferes most seriously with its reparative activity as it "is incapable of forming osteoid trabeculæ unless in close contact and union with previous bone formation or calcareous salts." Sufficient periosteum, therefore, should be preserved to thoroughly cover in the line of contact between the bone ends and should be carefully stitched in place.

In the epiphysis of the normal knee-joint, therefore, we are dealing with a part similar in general structure to the shaft of the bone, but quite different in its reparative power and activity owing to the absence of the endosteum and bone marrow and to the porosity of the cortex. After excision of such a joint, "Union is effected through the medium of strong cicatricial bands analogous to those met with in fibrous ankylosis" (Ashhurst), or, as Wieder explains it, a ring of cartilage forms which is not changed to bone until long after union is supposed to be complete. Along these bands osteoblasts gradually deposit bony tissue, and true union finally obtains, though long after the operation. Wieder also showed that in a femur which had been partially cut through and which therefore had the benefit of the remaining portion as a splint, bony union was not yet complete after 280 days and that the deposit of permanent callus begins about the end of the seventh week. He says, "The fact that in fractures that had apparently united perfectly, there is, up to three months, nothing but cartilage and connective tissue across the line of fracture, is one that is never considered, although it may be of considerable importance. Jacquemin evidently recognized the clinical importance of the fact that the callus was pliable for a considerable length of time, for he succeeded in correcting angular displacement by extension and gentle pressure several months after the apparent union of the fracture." Wieder then calls attention to a

fact frequently observed by orthopedists, viz., that the X-ray will show the line of fracture in a bone a year or more after it has occurred or has been regarded as entirely healed, not as a dense line of hard bony tissue, but as a lighter line of cartilaginous or fibrous tissue. When, therefore, there is noted such delay of ossification in the shaft of the bone where conditions are most favorable to osseous union, how much more likely is it to be still further delayed between epiphyses where activity of repair is not nearly so great?

There are numerous disturbing factors in the diseased joint which have important bearing upon the reparative activity of the related parts and which must be considered by every one engaged with this class of cases. The first of these is the patient's physical condition. By far the vast majority of these patients have suffered long and more or less severely from the attack of the disease. General functional activity has become impaired through pain or disability of the affected part and there has occurred not only loss of weight and physical strength, but as well alteration of the nutritional processes through blood and tissue changes. Anemia is always more or less marked. There is anorexia with disturbance of digestion; sleep is restless because of local pain or general dyscrasia and the impairment or derangement of all bodily activities and functions has engendered a condition which at once rises before our minds as typical of the infection with tuberculosis. This state cannot but exercise a deleterious influence upon the repair of an injured part and was most pronounced in the eight-year-old case first mentioned.

Another intrinsic factor is thus mentioned by Dacosta (Modern Surgery, p. 389), "If osteoblasts fail to proliferate with sufficient activity, the mass of granulation tissue (vascularized fibroblastic and cellular mass) becomes fibrous tissue, bone is not formed at all or is very scantily formed and fibrous union occurs. If the osteoblasts lack activity but are more active than in the case just cited they form cartilage extensively, but cartilage only; consequently cartilaginous union occurs."

The cause of this failure on the part of the osteoblasts may not be manifest and yet the fact remains that it is an actual condition,

and when such obtains, deformity will result unless proper retentive apparatus is worn for a long period of time or muscle balance has been secured by surgical procedure whether by tenotomy or by tendon transplantation.

Again, a joint which has been the focus of a chronic tubercular infection has suffered more or less (and usually more) extensive changes in the structure of its component parts. Inflammatory exudates have invaded every portion with consequent proliferation of connective tissue and granulation cells. The result is serious impairment of nutritional changes especially of anabolic activity affecting every portion of the joint and influencing profoundly the recovery of the part after excision. In addition to the inflammatory exudates or proliferates, there occurs the widespread infiltration from disease activity itself. The keynote of the pathology of a tubercular process is cell proliferation, and this occurs not in a circumscribed area and mass, but ramifies in different directions and permeates and infiltrates all surrounding or adjacent structures. At operation, the removal of the major portion of this tissue is feasible, but much still remains to be organized into firm and dense new tissue which is later appropriated by the normal and healthy structures. So long as this tissue is well nourished and its circulation is unimpaired, total removal is unnecessary, as when the source of irritation is removed proliferation ceases and organization occurs, yet the invasion of the tissues concerned with reparative processes hinders normal cellular activity and hence delays the healing of the parts after operative measures. If, on the other hand, the circulation and nourishment are not maintained, breaking-down follows and sinuses form which may persist for years and through the constant bathing of the parts with infected and infective discharges, repair is hindered and recovery delayed. There may even occur a spread of the infection with subsequent destruction of the areas previously healed and extensive abscess and sinus formation, all of which will most seriously menace the ultimate recovery of the involved part or even of the patient himself.

Of the intrinsic factors, Wieder found that incomplete fixation of the fragments of a fracture, delayed the union to a marked

degree. Everyone is familiar with the difficulties encountered in the endeavor to immobilize the parts in an excised knee. The muscular thigh makes the first application of plaster inefficient so far as concerns fixation, and secondary muscle atrophy increases the possibilities of motion between the bone ends. In either event, mobility, however slight, increases the inflammatory activity and hence the formation of fibrous tissue and interferes with the activity of the normal reparative processes. It is highly desirable in all cases of resection, that as nearly absolute immobilization as can be secured shall be maintained and when extensive removal of bony and ligamentous parts has been rendered necessary by the extent of the disease, some form of internal fixation shall be combined with the external. For instance, if the excised mass has extended to, but has not involved the posterior ligaments of the joint (flexion deformity being present) practically absolute immobilization will be secured by applying plaster of Paris with the leg in the extended position. If, however, the excised part has included the entire joint, marked flaccidity will result which is almost impossible of fixation by external means alone.

In close relation to this fault is the improper or imperfect apposition of the raw surfaces. Very frequently a space of from one-sixteenth to one-fourth of an inch exists between the apposed parts. Whether because of projecting points or uneven removal of the excised portions and to avoid the greater shortening than is absolutely necessary, or perchance to favor free drainage, the relation is maintained with the result that a very large mass of connective and fibrous tissue must be interposed to secure union and there is increasing difficulty and delay in the deposit of bone for final ankylosis. The difficulties in the way of determining the exact amount of bone to be removed either for corrective purposes or for accurate adjustment are recognized as extreme, even by experienced operators, and the great disposition to rely upon the kindliness of nature in repairing breaches and deficiencies is present with all, but remembrance of the structure of the parts involved and their naturally slow reparative power will cause one to be more careful and painstaking to secure such accurate coap-

tations as will render the effort of repair very much less arduous and so hasten the ultimate recovery.

Again, in many instances, extensive curettement of disease foci leaves large openings to be filled by blood-clots, granulation or other tissue. These, in turn, interfere as in the other instance with the deposit of bone in the part. Whether these cavities heal by blood-clot or continue to discharge for a long period of time, alters the ultimate results but little as bony deposits may take place about an infected or discharging part, even to the extent of causing practically complete ankylosis. However, the fact remains that the more accurate the coaptation of the raw surfaces, the more rapid will healing result and the earlier will bony union be secured. The traumatism of operation is of importance here as in other portions of the body. As mentioned previously, the periosteum is frequently destroyed or removed from the edges of the bony ends and the reparative power of this structure seriously impaired if not entirely lost. In this portion of the bone, it (periosteum) is the most important element in the proliferation of new bone and care should be used to save and carefully replace this membrane in close contact with bone so that it may be stimulated to its greatest activity. In the last (April 1908) number of the Amer. Jour. of Orthop. Surg. is an article by Thorndike, which very strongly emphasizes the importance of the periosteum in its osteogenetic function and the necessity of saving it when proliferation of bone salts is desired.

Extensive destruction of blood-vessels is to be avoided if possible, as upon the circulatory activity is dependent much of the reparative process. The greatest amount of the blood-supply is received from the nutrient artery through the epiphyseal line, but many smaller vessels also enter the epiphysis from the periosteum at the sides of the condyles and the tibial head. Obliteration of these vessels may impair nutrition very profoundly and no greater disturbance of these structures should occur than is absolutely necessary. While the enumeration of these deleterious or restraining influences may appear superfluous or too much in detail, yet we feel that collectively they demonstrate clearly the very profound effects which are or may be exerted upon a part which nature

has endowed with rather low reparative powers and will emphasize the necessary consideration of the likelihood of slow repair after the operation of excision and hence the careful use of fixative or retentive apparatus until bony union is complete, which in this part, as shown conclusively by Hoffa, Wieder and others, requires one and a half to two years' time.

Our conclusions from the foregoing may be summed up to as follows:

1. Writers and operators differ as to the length of time fixation or retentive apparatus should be worn after excision.

2. Flexion deformity is much more likely to occur before twelve years of age when union is fibrous or cartilaginous.

3. Bony union is more probable after this period by reason of the increased activity of the osteogenic tissue in the part.

4. Deposit of bone normally takes place more slowly in the epiphysis because of the histologic structure of the part.

5. Intrinsic influences, such as altered states of the health, blood changes, and functional disturbances may and do retard the process of healing after operation.

6. Extrinsic factors, such as incomplete fixation, imperfect coaptation, excessive destruction of the periosteum, interference with the blood-supply, cavities, sinuses and infiltration of surrounding parts also delay the ultimate bony union.

7. As bony union after fracture of the shaft of a long bone is not complete for from nine months to a year, it will require nearly as much more time for completion in the epiphysis because of the structure and intrinsic and extrinsic factors.

8. That during operation sufficient periosteum should be preserved to entirely cover over the line of contact of the excised parts and that accurate coaptation and as nearly absolute fixation of the bone ends as possible should be secured.

9. That fixation should be maintained for a period of at least a year and probably nearly two years after excision to avoid the danger of flexion or other deformity.

## VI.

# THE NON-OPERATIVE TREATMENT OF FRACTURE OF THE FEMORAL NECK.*

BY A. MACKENZIE FORBES, MONTREAL.

The subject of my paper has engaged the active interest of our fraternity for so long a period of time that, possibly, it may seem old in your sight and unsuitable for discussion. I am, however, taking the liberty of presenting it for two reasons, firstly, because it is a subject of such importance, and, secondly, because it has been one of great interest to me from an anatomical point of view during ten years' study in the dissecting-room of McGill University.

It has been the custom until recent years to classify these fractures as intracapsular and extracapsular, according to the position of the lesion, but this classification was found to be imperfect because of the character of the attachment of the capsule, the anterior part of which is attached to the shaft of the femur at the intertrochanteric line, while the posterior fibres fall short of the intertrochanteric line and cover really only the inner half of the neck of the femur; thus, while it is possible to have a fracture which is wholly intracapsular, it is impossible to have a fracture wholly extracapsular.

For convenience of description, modernists now classify fracture of the femoral neck as lateral and medial, under which terminology I shall now discuss their treatment.

Until quite recently the treatment of fracture of the femoral neck has been notoriously discouraging.

In 1834, Sir Astley Cooper, in a letter written to the *London Medical Gazette*, speaking of Intracapsular Fracture, says, "I believe that these fractures unite by ligament and not by bone,"

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but "to deny the possibility of their union and to maintain that no exception to this general rule may take place would be presumptuous."

In 1864, Bigelow remarks that "While the impacted fracture of the base of the femoral neck unites by bone, if at all, there seems to be a decreasing tendency to osseous union as we approach the smaller portion of the neck near its head.

In the last edition of Hamilton's work on Fractures and Dislocations are these words, quoted from Mr. Robert Smith: "In all the functions of the limb are forever impaired. Whether the fracture is within or without the capsule, whether united by ligament or bone, shortening of the limb and lameness are the inevitable results."

Of more recent date are the words of Scudder: "Of especial value in this connection are the conditions existing in sixteen cases of fracture of the hip many years after the accident. These sixteen cases were treated at the Massachusetts General Hospital by traction and immobilization for periods varying from a few weeks to a few months. The patients then went about on crutches. These cases reported for examination from two and one-half to twenty-four and one-half years after the accident. Thirteen of the sixteen cases have impairment of the functional usefulness of the leg; a weakness of the limb, necessitating a crutch in many instances; all movements of the hip somewhat restricted; atrophy of the muscles of the thigh, buttock and calf of the leg; a decided limp requiring a cane; pain in the hip descending down the thigh, even to the sole of the foot; pain at night in the hip; pain in going upstairs and stooping over.

In only two cases out of the sixteen could it be said that the leg was functionally useful."

In 1902, Sir Wm. H. Bennett says of the intracapsular variety, "bony union will not occur."

This spring, through the kindness of Dr. Wm. F. Whitney, I was permitted to examine the pathological specimens of fracture of the femoral neck preserved in the Museum of the Harvard Medical School.

Of the twenty-five specimens of fracture of the femoral neck

of both varieties recorded by me, union was found in five only. As Bigelow's *dictum* seems to be true that there seems to be a decreasing tendency to osseous union as we approach the smaller portion of the neck near its head, it did not surprise me to find that the minority of these were of the medial or capital variety, but I do not attempt to make any deductions from the examination of these cabinet specimens as, without the clinical history, it is manifestly unfair to do so.

During the early and middle parts of last century heated discussions were common as to the possibility of bony union occurring in the medial or capital variety. Sir Astley Cooper believed such to be possible, but extremely rare, and thus explained their rarity:

1. The neck of the thigh bone when broken is prevented from uniting by contraction of the muscles preventing its apposition to the head. "If this, however, were the only obstacle it might be argued that the retraction of the thigh bone could be prevented by bandaging and extension, the truth of which cannot be denied; but it is scarcely possible, even for a few hours, to preserve the limb in exact apposition."

2. A second circumstance which prevents the bony union of these fractures is want of pressure of one extremity of the bony neck upon the other. "This arises principally from the action of the muscles which separate the broken surfaces."

3. "The third reason which may be assigned for the general want of union of this fracture is the almost entire absence of nutrition in the head of the thigh-bone when separated from its cervix, its life being supported by the ligamentum teres, which has only a few minute vessels ramifying from it to the head of the bone."

4. The fourth reason which may be assigned for want of union by bone is the natural change of the cervix femoris in old age, the atrophy of its structure which diminishes its power of resistance as well as its capability of restoration.

The position to-day of the medical profession is an interesting one. From conversations I have had with many general surgeons, I should say that the views of Sir Astley Cooper, or possibly some modification of these views, are still held; on the other

hand, orthopedists and those especially interested seem to possess more hope, thinking rather that our evil experiences in the past have not been due so greatly to the impossibility of obtaining bony union in medial or capital fractures as to the impossibility of obtaining this without first attaining a proper apposition of the parts.

I cannot prove that union in medial fractures can be obtained in every case where proper apposition is assured, but the fact that necrosis of the head does not or rarely follows its separation makes it highly probable that its union is possible, even in those most rare cases suggested by Sir Astley Cooper where it is cut off or almost cut off from the circulatory system. Let us grant that in such a case it is impossible to have the formation from it of those arterioles which precede callus, that from it there are not produced those arterioles whose function it is to meet similar ramifications from the distal or shaft fragment. Surely it is possible for the vessels of the distal or shaft fragment to reach to, and enter into, the capital fragment, which apparently retains its vitality possibly through its immersion in the synovia—a fluid possessing all life-sustaining properties.

If this, then, be possible can we not have the formation of callus, but callus primarily produced from the distal fragment?

To those who accept this hypothesis the natural corollary is that apposition of the fragments is the essential to bony union and without apposition union of a capital fracture can scarcely be of an osseous character.

What was done by our predecessors to assure this apposition? Does their treatment by extension in the long axis of the body with a Liston or similar splint demonstrate either their appreciation of the anatomical position of the fractured ends, the anatomy of the capsule and muscles assuring the integrity of the joint, or the necessity for securing direct apposition of the parts?

Little do they seem to have appreciated the strength of the normal capsule or the strength of the surrounding muscles. Little do they seem to have realized that the integrity of the hip is due more to the tonicity of the surrounding muscles than is the integrity of any other joint.

So greatly were the minds of our predecessors impregnated with the doctrine of the hopelessness of any attempt to secure a satisfactory result following fracture of the femoral neck that little or nothing was done to secure apposition of the fragments, unless the application of extension by weight and pulley was expected to do this.

It was felt to be safer to do little or nothing actively toward the opposing of the fractured ends, because, if impaction existed, it might be broken and impaction was looked upon as an advantage.

Extension in the long axis of the body was used to immobilize, but what could have been the use of immobilizing fragments which were not opposed. It is true that, even at this date, Lucas Championniere says of reduction in general: "The public should be informed that it is not necessary to make a perfect mend," but he did not speak of fracture near a joint where any exuberance of callus might mean restricted motion.

The principal deformities at the seat of the fracture were rotation of the distal fragment, with a protrusion forward of its broken extremity caused by the external rotation of the leg and an in-drawing of the upper extremity of the femur by spasm of the rotators.

Extension in the long axis of the body might bring down the distal fragment, but it would not affect the tilting forward of its extremity. The only attempt made to do this was in that made to prevent the external rotation by controlling the foot, but of what avail could such attempt be while spasm of the rotators held the distal extremity firmly fixed in a position perhaps anterior to the capital fragment.

If, then, there was no rational attempt made at setting the fragments, how could osseous union be expected when apposition is so essential? Surely there is some justification for the words of Arbuthnot Lane: "It was evident that the displaced fragments of a broken bone were never, or hardly ever, restored to their normal position and that the so-called setting of fractures was a myth. In most cases the treatment by manipulation and splints was not based on any scientific or mechanical principle."

Again, in intracapsular fracture the treatment of which was

notoriously devoid of good results, less was accomplished in reality toward securing apposition than in extracapsular fracture, because on mechanical principles further anterior displacement of the femoral fragment must occur than in lateral or femoral fractures.

It is the rule that complete restoration of the fractured bone varies inversely with the age of the individual, yet capital fractures—those most frequently left unset—are found more especially in the aged.

The anatomical principles for the opposing of the two fragments was first demonstrated over thirty-five years ago by an American; I refer to the late Prof. T. J. Maxwell. Why so little is known of this man's work I cannot divine, but as a student of anatomy I draw your attention to its value.

The obstructions to the reduction of the fragments in fracture of the femoral neck are muscular.

Elevation of the proximal end of the femoral fragment is by muscular spasm, as is the external rotation of the whole extremity and, again, so is the approximation of the femoral fragment. The interposition of capsule or iliopsoas muscle is also due to muscular spasm.

Our greatest aids in the reduction of the hitherto irreducible deformity at the seat of the fracture are muscular, capsular and bony.

The elevation of the femoral fragment can be controlled by extension in the long axis of the body or by leverage exercised on the upper rim of the acetabulum as a fulcrum.

The external rotation of the whole extremity can be controlled by extension, both anterior and lateral.

The interposition of soft structures can be controlled, to the correction of the elevation and external rotation, by flexion to the point of relaxation of the iliopsoas, which is the chief offender.

In so far as I know, there are but three methods of treatment based on these anatomical facts: those of Maxwell, Whitman and Bardenheuer; but as the last is more or less of a modification of the former without any essential difference, I shall confine

myself to a discussion of the methods of Professor Maxwell and Dr. Whitman.

By Whitman's method apposition of the fragments is obtained in this manner: "The shortening having been overcome by traction, the limb is abducted to utilize *the tension on the capsule to direct the outer* toward the inner fragment contained within the acetabulum and to bring them into a more or less apposition. The attitude of complete abduction makes muscular contraction powerless to induce deformity." Contraction of the iliopsoas would tend to draw the femur directly inwards and thus to appose rather than to separate the fragments. Fixation is, however, more directly assured by the contact of the neck with the rim of the acetabulum and of the trochanter with the side of the pelvis."

Maxwell, on the other hand, endeavors to obtain apposition of the fragments by the tension of the muscles and the capsule through lateral traction.

"Perfect adjustment of the fragments must occur when traction is made in line with the normal action of the femoral neck, provided the capsular ligament is not almost or quite destroyed together with the surrounding muscles." Adjustment and retention of the fragments are easy and certain if the anterior strongest part of the capsule remains intact. Sufficient traction in the normal line of the femoral neck compels the capsular ligament to act as a close-fitting sleeve, to adjust and align the fragments, and, "if said traction be maintained, the rotation will also be undisturbed." This lateral traction is combined with traction in the line of the body.

In the Whitman method fixation "is more directly assured by the contact of the neck with the rim of the acetabulum and of the trochanter with the side of the pelvis." In this method the patient's fractured extremity is fixed in a plaster-of-Paris spica, whereas, in the methods of Maxwell and Bardenheuer, the anterior-lateral extension combined with extension in the line of the body with counterextension assures the same result.

In both methods, impaction is broken down in the endeavor to get normal alignment.

As to results: Perhaps the greatest recommendation for the method of Whitman is the results published by John B. Walker in the *Annals of Surgery* in January, 1908, because, as Dr. Whitman has remarked, the method had been applied by those who had no previous experience or special training in the use of plaster of Paris.

In four patients at the end of six, nine and twelve months' treatment was followed by no deformity, pain or discomfort. Motion was free and they were able to resume their regular work.

Five other patients who had been under treatment for less than four months were up and walking on crutches.

Of the results of treatment by the method of Maxwell, we will quote from an article by C. E. Ruth, published in the *Therapeutic Gazette* of 15th March, 1907, who, quoting from reports of seventy-two cases, summarizes thus: In twelve cases between eighty and eighty-eight years, union, with ability to walk well, eight; non-union, treated only four or five days, two; paralysis preventing walking, two; in patients under eighty, no failure to secure union.

No failure to secure serviceable limbs in any case under seventy years so far reported, excluding cases in which treatment was abandoned inside of three weeks, death from intercurrent malady or in which injury is too recent to report. "This gives serviceable limbs in 100 per cent. in cases under eighty years of age."

As Dr. Ruth might perhaps be open to the accusation of partisanship, I am taking the liberty of quoting from Dr. Ochsner (*Annals of Surgery* October, 1904):

This surgeon reports having treated sixteen patients whose ages were 30, 37, 37, 43, 47, 53, 54, 57, 58, 60, 62, 66, 76, 78, 79 and 80 years. Two of these died: one of diabetic coma and one of exhaustion. He says: "There was union in all of them. The amount of shortening in all of them was less than 3 cm."

The practical deduction from the above is, then, that the treatment of fracture of the femoral neck should yield good results when due regard is paid to the possibility of securing alignment through the anatomical relations of the neck, provided always

that the patient's general condition is sufficiently good to stand treatment.

Personal experience would add to this deduction, that each of the two methods mentioned has a distinct place in the treatment of these fractures. For a young or, more broadly, for a strong person the method of Whitman is of the greatest value, but is open to the following objections suggested by Dr. Ruth:

"*First*, fractures through and causing separation and splitting of the great trochanter make the correction of the deformity impossible by abduction, because the leverage of the femoral shaft upon the top of the great trochanter against the brim of the acetabulum as a fulcrum cannot be used to render the capsule taut and so secure and maintain alignment of the fragment."

"*Second*, the rapid loss of adipose in the obese who represent a large proportion of these cases. These are notoriously bad cases for the use of plaster, because of, first, lack of fixation and, secondly, impossibility of maintaining extension."

"*Third*, the aged who form the major portion of these cases are illy prepared for prolonged pressure contact, hence the damage from the use of a permanent dressing which does not admit of ready change or inspection and release of damaged points from pressure."

For an older patient or for one less prepared to stand the irksomeness of plaster as well as for the exceptional cases suggested by Ruth, the method of Maxwell is no doubt to be preferred.

It has been said that it does not disengage and correct the distortion of the incomplete or impacted fracture, but this impression is badly founded, as the primal manipulations, which may be made under an anesthetic, are surely expected to do this.

My one objection to it is, the amount of supervision required to a nonpermanent dressing.

Before concluding, I must add that it is conceivable that there may be some patients who are unfit for either form of treatment suggested. Some aged and asthenic, in whom we are without hope of securing bony union, are best treated, as suggested by Sir Wm. Bennett, by massage and passive motions.

Says Sir William: "There is one injury in which the effect of the use of this plan from the beginning is most remarkable, viz., intracapsular fracture of the neck of the thighbone. In such cases, as you well know, the pain is sometimes very acute, and the spasm is often almost continuous, the patient complaining bitterly of the jumping of the limb and the intense discomfort caused by the spasm.

The suffering resulting from the spasm can be removed very rapidly by smooth rubbing of the sort I have described. In such fracture it is unnecessary to trouble about adjusting the fragments. Bony union you know will not occur and, failing that, the indication is to obtain as useful a limb as may be. (Massage in Recent Fractures, etc. Sir Wm. H. Bennett, 1902.)

In conclusion, then, I may say that there is no one all-sufficient nonoperative method of treatment for fracture of the femoral neck. Union can be expected where we are able to attain apposition of the fracture and to maintain that apposition by active treatment, but, because this fracture is common in the aged and the asthenic, there will occasionally be presented to us patients in whom it is wisest to abstain from active treatment and to seek only the comfort of the sufferer.

## VII.

# THE OPERATIVE TREATMENT OF INTRACAPSULAR FRACTURE OF THE NECK OF THE FEMUR.*

BY GWILYM G. DAVIS, M. D., PHILADELPHIA.

In spite of the amount of work which has been done on intracapsular fractures of the neck of the femur, the treatment cannot be said to have been standardized as yet. If this were not the case, instances of ununited fracture in those who do not suffer from the debility of old age would not be so frequent as they are; from one to three of such cases come under my notice every year. The usual treatment these cases have had has been by adhesive plaster, extension and sand-bags, but one such case was treated by forced abduction in plaster of Paris. A full bibliography of the subject of ununited fractures of the neck of the femur has recently been given by Dr. H. A. Wilson in the AMERICAN JOURNAL OF ORTHOPEDIC SURGERY, of January, 1908.

In September, 1900, the writer published a report of two cases in the *University Medical Magazine*. In all the operations referred to in this article on ununited cases the anterior incision down from the anterior superior spine of the ilium was used. In the first case operated on in the summer of 1899 the edges of the fragments were freshened and pinned together with two steel pins driven through the great trochanter and neck into the head, the ends of the pins being allowed to protrude. This man had chills, fever and sweats and nearly died of sepsis, which disappeared as soon as the pins were removed. While the patient had firm union ten weeks after the operation, the case relapsed and was again operated on. This case disinclined me to the use of pins; so in the second case, six months later, two ivory pins, eight and one-half centimeters (three and one-half inches) long, were used. This man was discharged from the hospital after an uneventful convalescence, walking with a cane, and claimed that his

* Read before the American Orthopedic Association, in Chicago, June, 1908.

hip was strong and all right. Two or three years later I met him in our almshouse and from a cursory examination his hip appeared to be again loose, but without pain. He was a vagrant, had a Chopart amputation of the foot of the affected side and was satisfied with his condition. A year later, Case No. 1 returned with his hip again loose. The second case having been apparently successful with ivory pegs, these were again used. In two months, however, union had not occurred, so another operation was done, and the fragments firmly fastened with two silver-plated wood-screws, about three and one-fourth inches long, which were left in *in situ*. Recovery was uneventful, and this case eventually turned out satisfactorily.

The next case was similarly operated on and screws inserted; primary healing occurred, but he was a fault-finding individual and refused to use the limb, claiming the hip pained him. I therefore suggested to a colleague to remove the screws. This was attempted, but failed, and a nasty suppurating tract was left. I was then compelled to operate and remove the screws; union was perfectly firm, but suppuration persisted for a long time, but now it has ceased and he can walk without any pain and needs no support. About this time, I assisted my colleague Dr. Keen to operate on another case in which screws were inserted and which remained healed with satisfactory results.

Another case, that of a woman about fifty years of age, was operated on with the screws. Some suppuration followed this case, but there is no note of the screws being removed. She healed up and resumed her work with a satisfactory result, although she for some time, at least, used a cane.

These experiences caused me to look upon the introduction of foreign bodies for the purpose of fixation with distrust so that when the next case appeared, in a plasterer aged fifty-three years, the edges were simply freshened and the leg placed in plaster of Paris in extreme abduction.

Healing was uneventful and the man resumed his occupation as a plasterer, proof positive of a satisfactory limb. A second case, of a woman aged fifty-four, was treated likewise by freshening the edges and placing the limb in plaster in an abducted position.

In three months she was walking without crutches, but since then she has had rheumatism of the knee and affected limb and recently has had to resume the use of crutches. She does not complain of the hip.

A third case, in a woman aged thirty-four, had likewise an uneventful healing. The hip had been fractured six months previous to the operation and she was completely disabled and could do nothing to earn her living. After the operation she walked without crutches or any support around the house, but uses a cane, as she feels timid, in the streets. She has since obtained a position and is earning her living.

I believe as good a result, as far as the hip was concerned, was obtained in the second case as in the other two, and had she not been afflicted with severe rheumatism could also have walked without support, as indeed she had at times done.

From these experiences I feel that at least as good results can be obtained without the introduction of any foreign bodies, such as nails, screws, etc., for fixation as can be obtained by their use. They are liable to give rise to grave septic disturbances in healing and may require subsequent removal. It is of course necessary after freshening the fractured surfaces to put the limb up in extreme abduction in plaster of Paris until union is complete, say ten weeks.

In Dr. Wilson's article Dr. J. Chalmers DaCosta is mentioned as being the first to apply the method of direct fixation in recent intracapsular fractures of the femur, but a reference to the *Annals of Surgery*, August, 1905, p. 282, will show that the writer presented to the Philadelphia Academy of Surgery, on April 3, 1905, a case of a man forty-seven years of age in which six days after the injury an ordinary steel wood-screw, three inches long, was inserted through an incision over the greater trochanter. A sinus formed and the screw was removed by a colleague after having been in eight weeks. The result in this case was perfect. The use of the method was advocated for recent fractures, but now we are inclined to doubt its necessity. Three inches in length is about as long as it is safe to use nails or screws for fixation purposes, otherwise the acetabulum is apt to be wounded.

## VIII.

## DROP PHALANGETTE.*

BY WALTER G. STERN, M. D., CLEVELAND, OHIO.

The essential lesion of drop phalangette (first described by Abbe in 1894 as "drop" or "mallet finger") is a subcutaneous rupture or overstretching of the extensor tendons of the finger at or near their insertion into the base of the phalangette (distal or ungual phalanx). This causes the phalangette to drop down—in the sense of becoming flexed—to a degree up to a right angle, depending upon the completeness of the rupture of the tendon. The patient is unable to voluntarily extend the phalangette, while *passively* full extension is always possible. The symptoms often seem to be all out of proportion to the injury causing the deformity.

The mode of occurrence of "drop phalangette" is not always clear, especially where the patient was not making any violent physical exertion at the time of the occurrence of the deformity, as in the case of Abbe's architect, who was lightly brushing bread-crumbs from his drawing-board. The usual cause, however, is some sudden and unexpected opposing strain put upon the tensely extended fingers, as, for instance, when trying to take off tight or wet underwear by shoving across the heel or malleoli with the tips of the fingers, or when in the pursuit of some athletic sport an unexpected blow is received upon the dorsum of the distal phalanx as in baseball or basket-ball.

The strength of the extensor tendons and their periosteal insertions is such that a straight pull would hardly be able to rupture them. In several incomplete cadaver experiments made to determine the pull necessary to rupture these structures I found that the tendons became mashed in and pulled out of the clamps of the spring scales, before they ruptured or tore out of their insertions.

* Read before the American Orthopedic Association, in Chicago, June, 1908.

Abbe deduces from the experience gained at one of his operated cases that the force which produces this deformity is not one which is directed exactly perpendicular to the dorsum of the finger, but rather one that comes to one side or the other just as one would go about it to tear a narrow strip of rather tough paper. In this case Abbe found the capsule was stretched and the tendon lacerated only on the radial side and not upon the ulnar side of the phalangette. One of my cases (No. VIII) gives a distinct history and showed plain evidence that the force (a basket-ball) impinged upon the dorso-ulnar and not the dorso-radial aspect of the distal phalanx.

If one were to be guided solely by the written word, the only conclusion that could be drawn from the paucity of the literature would be that drop phalangette is one of the rarest of deformities. A careful search of the Index Medicus and the catalogue of the Surgeon-General's library reveals only the two papers by Abbe (five cases) and the report of an unrecognized case in the *British Med. Jour.* of 1896 by Kohn which the surgical reviewer of this publication held to be an unrecognized fracture. (This case was reported only on account of what were then—1896—interesting X-ray findings of bone atrophy in the terminal phalanx from disuse and compensatory hypertrophy of the middle phalanx in a case in which the deformity had existed for eighteen years. Even after this long period of disuse the phalangette could be fully extended passively.) Whitman mentions the fact of its occurrence, as does Nichols in the Reference Handbook. The only reference that could be found in the French or German literature is a complete exposition of the subject in about fifty words by Gurlt in Eulenberg's Real Encyclopedie which of course ignores Abbe's previous description. Dr. C. A. Hamann, of Cleveland, in a personal communication, spoke of having operated upon three cases, two of whom were medical students.

Whether or not the greater zeal of "Young America" in the last decade for the rougher and more vigorous athletic sports—baseball, basket-ball, hockey, etc.—has given rise to a fresh and increasing crop of cases or whether surgeons have been prone to

dismiss the subject as a minor consideration, it seems to me that we see, at least in our large cities and among our medical students, a large and increasing number of these cases.

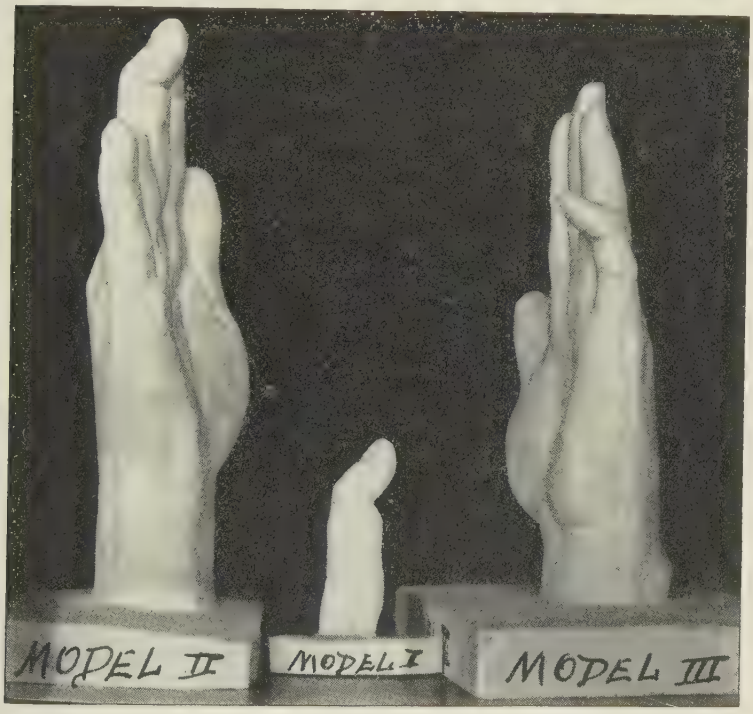
The other results of the force necessary to produce the typical deformity—the pain, tenderness and swelling—are usually so slight that the immediate occurrence of the deformity is often unnoticed. One of the most typical modes of occurrence is described by Abbe and is shown in Case V of my series. The patient is attempting to force tight or damp underclothing off of the foot; to get them around the ankle and heel one invariably uses the tips of the extended fingers, in both cases after the completion of the task the patient noted that the distal phalanx of one or other of the fingers was bent downward at a right angle, and try as he might the finger could not be straightened out voluntarily. It is nothing more than natural that the patient should also have made the immediate discovery that the joints and bones were uninjured and that passive extension was possible. It may be that the mildness of their physical sufferings is one of the reasons why so few cases come to our clinics and that most of the cases treated are from the higher walks of life. Buttoning tight buttons, blows on the finger-tips in wrestling, basket-ball, baseball, bowling, using the punching bag, stumbling while running, etc., are among the etiological factors in these cases. In only one of my cases was the deformity produced by other than indirect violence. In this case the boy caught his finger in a bureau drawer, and although the skin was unbroken, the sharp line of the bruise could be clearly seen extending across the base of the phalangette between the joint and the finger-nail.

As mentioned above, the subjective symptoms are usually slight. There may or may not be a snap or sharp pain at the moment of the injury; the pain, swelling and tenderness disappear in a few days under the influence of the usual hydrotherapy, leaving a hook-like finger which is usually in the patient's way. (Model I.)

Objectively, there is little to be noted excepting the dropping of the phalangette, the inability of the patient to fully extend it and the possibility of complete passive extension. The use of the

X-ray reveals a normal condition of the bones of the phalanx, while in old and neglected cases as in the one described by Kohn the terminal phalanx may be atrophic while the middle one shows a compensatory hypertrophy, especially as to length. Case X shows some atrophy of phalangette after twelve years' disuse.

Untreated, the condition does not tend to improve, and yet con-




trary to what we might be led to expect from the final results of unopposed muscular action as seen in certain cases of paralysis, the flexor tendon shows no tendency toward contracture.

The diagnosis is usually easy from the typical history and train of symptoms. It ought not to be difficult to separate these cases from those of ulnar palsy, fracture, dislocation and subluxation of the distal phalanx—base ball finger. Subcutaneous laceration or dislocation of the extensor tendon over the knuckle gives a dropping of the first or middle phalanges which are ex-

tended by the action of the extensor communis digitorum above while the phalangette which is extended by the action of the dorsal interossii and lumbricales combined, and not the extensor communis (Grey and Spalteholz), is hyperextended (Ritschl. *l.c.*) In cases of doubt as to fracture or subluxation the X-ray is the court of last resort.

In fresh or early cases, overextension of the phalangette in a suitable splint is all that is necessary for the complete union of the injured tendon and recovery of function. In old or resistant cases it is necessary to cut down upon the injured part and securely anchor the tendon to the periosteum of the phalangette. Neither Abbe, Hamann, nor myself have found it necessary to touch the joint capsule. Complete recovery of function took place in every case treated.

The following cases have come under my care:

Case I.—Female, age thirty, was trying to button up a stiffly starched shirtwaist when she felt a stinging sensation in the last joint of the middle finger of the right hand. Her sister completed the buttoning for her. After finishing her toilet she attempted to put on her kid gloves when she noticed that her finger was bent and that she could not straighten it out. There was very slight pain and swelling. A few days later when she applied for treatment the pain and swelling had subsided, the finger was sharply flexed to a right angle in the last joint and the phalangette could not be extended actively although the joint was freely movable passively. An X-ray examination was negative. Treatment consisted of overextension and fixation in an aluminum splint for six weeks followed by baths and motion. Cured.

Case II.—Boy, age eight, while catching ball was struck on the nail of the index finger of the left hand. Severe pain at the time of the injury was relieved by the liberal use of cold water. He was back to school the next day as usual; about eight days after his injury his teacher noticed that he was awkward in using his hand and upon examination she found that the distal phalanx of the injured finger hung down uselessly.

The next day I found the finger to be flexed in the last interphalangeal joint and could not be voluntarily extended. There was no swelling and only slight pain and tenderness. Passive extension was freely possible. Overextension in a wire splint for 4 weeks, followed by baths and motion completed a cure.

CASE III.—Female, age forty-five, while wresting with her daughter struck her finger against her opponent's shoulder. Her finger "crumpled up" and she was immediately unable to straighten out the last phalanx. A physician was called who found all bones and joints uninjured and advised cold applications. There was no pain following the injury, her only complaint being that "since the injury the thing will not stand up alone." She can make a perfect fist but cannot fully extend finger. An examination made 7 weeks after the injury reveals a dropped phalangette, active extension of the joint impossible; passive extension free. The treatment consisted in overcorrection and fixation for eight weeks. Cured.

CASE IV.—Male, age forty-one, was attempting to force the cover off a fruit jar by pressing the tip of the tightly gripping fingers against the small metal projection intended for the recess of the opening wrench, when he felt compelled to desist on account of a peculiar weakening sensation in the last joint of the index finger of the right hand. He experienced little or no pain at this time but was unable to straighten out the injured part. A few days thereafter he noticed some slight swelling which soon disappeared but he has not been able to extend the injured phalanx since the accident, although he can do so if he uses the other hand to do it. Six months after the accident he appeared for treatment. The finger (Model I) was held flexed as to the distal phalanx even when he was attempting to extend his fingers with all the strength at his command. Passively the motion in the joint was entirely free. Otherwise the examination as well as an X-ray picture was entirely negative. Feeling that little could be done by fixation I cut down upon the tendon and sutured it to the periosteum by means of chromic catgut under as much tension in the tendon as I felt allowable. The finger was then fixed in overcorrection for four weeks. Perfect recovery followed.

CASE V.—Male, age fifty-eight, an elastic stocking maker says he had gout while in England some twenty years ago. While trying to get off a pair of tight fitting and damp underdrawers without having first taken off his socks he pressed down hard with the tips of his extended fingers; he felt something snap, experienced no pain and was able to continue operations. From the moment of the injury on the phalangette of the middle finger of the right hand has been bent at a right angle (Model II) and he has been unable to voluntarily straighten it since then.

An examination made about four weeks after the injury revealed that all the fingers deviate slightly at the metacarpo-phalangeal joints to the ulnar side. All the phalangeal joints

are possibly slightly thickened but otherwise normal except for the phalangette of the middle finger of the right hand. This finger (Model II) is held flexed to a right angle at the distal phalanx, it can be fully extended passively but not actively and is otherwise normal; no contracture of the flexor tendons. An X-ray photo taken in both directions shows a normal configuration of the bones and joints except for the habitual flexion of the distal phalanx; no fracture or subluxation. Treatment refused. At the present date, about two years after the injury, the condition remains as described above.

Case VI.—Female, age fifty, was trying to tie the feet of a chicken when she slipped forward and struck the ground with the tip of the finger around which she had previously wound her string. The last joint of this finger (middle finger of the left hand) was doubled up in the accident and hung down quite helplessly. The pain and swelling were very severe necessitating anodynes and constant cold applications for several days. The phalangette of the injured finger was constantly held flexed and the patient was unable to straighten it. Passive extension was free and painless while any flexion beyond the degree assumed while the finger was at rest caused pain. No further treatment was instituted.

One and a half years later the finger was still in the same position and the patient still unable to voluntarily extend it though passive extension was fully possible An X-ray examination proved negative. The treatment now undertaken consisted in cutting down upon the joint and suturing the frayed and atrophic tendon securely to the periosteum under moderate tension followed by fixation in an overextended position to relieve the tension upon the sutures. Complete recovery followed.

Case VII.—Boy, age fourteen, inmate of an orphan asylum, caught his finger while surreptitiously closing a bureau drawer in the store room. The finger did not bleed after the accident. Secrecy being necessary he did not report his condition at the hospital but about a week later his teacher noticed that one of his fingers interfered with his writing and he was compelled to report for treatment. At this time a great deal of the pain and swelling had disappeared; there was a sharp line of discoloration extending across the base of the phalangette of the little finger of the right hand about 1/2 cm. proximal to the bed of the nail marking a distinct depression. The skin had not been and was not broken. The distal phalanx of the little finger was held flexed at an angle of about 45°. It could not be voluntarily extended although passive hyperextension was possible. An X-ray ex-

amination proved negative. Fixation in an overextended position for six weeks effected a cure. The nail has since been shed.

Case VIII.—Male, age sixteen, while playing basket ball had the heavy ball passed to him. While expecting the ball with outstretched fingers it hit the nail of the ring finger of the right hand on the outer (ulnar) side with great force and bent the last phalanx of this finger with what the patient declares to have been a loud snap. Before the evening had passed the finger was very much swollen, discolored and painful. Cold applications were made and in a few days all the symptoms had subsided. The patient then noted for the first time that he could not extend the tip of the injured finger although it could be raised painlessly if he used the other hand to do it.

Upon examination on the eighth day after the injury I found the swelling and pain to have totally subsided and that motion was free and painless and that the finger could be extended (passively) up to a straight angle. Pressure on the *radial* side of the base of the phalangette was painless but the outer or *ulnar side* was still tender to deep pressure. X-ray examination was negative. I interpreted the injury as a tearing or overstretching of the tendon from the ulnar half of its insertion as spoken of by Abbe. No contraction of the flexor tendon. Fixation in overcorrection for five weeks was followed by a cure.

Case IX.—Male, age twenty-six, has always been an enthusiastic bowler. Four weeks ago he bought a loaded bowling ball weighing about 16 pounds to practice with; after bowling a few straight balls with it he thought he would try a "side hook" when he felt something give way in his middle finger but he succeeded in rolling the ball. Immediately thereafter he noticed that the distal phalanx of the middle finger of the right hand was hooked downward and that he could not voluntarily raise it. There was absolutely no pain and swelling at any time. Two weeks afterward he casually, in class room, showed me his finger. Except for the fact that it was habitually flexed at the last interphalangeal joint at an angle of about 90 degrees it appeared to be perfectly normal. Voluntary extension was impossible, passive extension was free to a straight angle. No pain or tenderness. X-ray examination negative. Treatment refused.

Case X.—Male, age thirty-five, has had what he considered to be a "base ball finger" on the little finger of the left hand for the past twelve years. When playing on a college base ball team he was struck on the nail of this finger by a batted ball. He does not remember how the trauma was treated except that he took the resulting deformity of this finger as a matter of course as it was

called a "base ball finger." He was aware at all times that the joint was free and that he only lacked the power of raising the phalangette. He presented himself to me after a lecture out of mere curiosity. At the present writing the little finger is flexed at the last interphalangeal joint and the phalangette hangs down at an angle of 60 degrees. There is absolutely no contracture of the flexor tendons and the joint can be fully extended passively. An X-ray examination proved negative. Phalangette somewhat smaller than the one of the little finger of right hand. Treatment delayed.

Case XI.—Male, age fifty-one, while in the office of the dentist (Dr. Newcomb) who finished Model I for me, explained that he had a similar finger for fifteen years. At that time he was attempting to lead a rather wild colt and wound the reins about his left hand and fingers. A sudden plunge of the horse brought the free end of the rein down tightly over the end of the extended little finger which bent (flexed) at the last interphalangeal joint with distinct snap and sudden pain. He immediately loosened the reins from his hand, left the colt to run away and sought medical aid. A few hours elapsed before he could find a doctor and considerable swelling had set in. The physician could find no fracture or dislocation and diagnosed a sprain and advised cold applications and rest. On the third day the phalanx was slightly discolored, but on the fifth day all pain, swelling and discoloration had subsided and he again resumed his work. The little finger of the left hand presented a hooked-like appearance at its last joint and he was unable to straighten it out actively although he knew joint was free.

On May 22, 1908, examination of the hand and muscles of the forearm was entirely negative except for a dropping of the phalangette of the little finger of the left hand (Model III) which the patient is not able to overcome by actively extending the fingers. Passively the finger can even be slightly overextended showing the joint to be entirely free. X-ray examination negative.

## After Word.

I have chosen a rather obsolete expression in the title of "drop phalangette" in preference to that of "drop finger" as proposed by Abbe because the term "phalangette" distinctly localizes the deformity in the terminal phalanx.

I have also not deemed it necessary to make more than passing reference to the anatomy of the extensor tendons. I have fol-

lowed Grey and Spalteholz in their explanation of the components of the tendons of the dorsum of the fingers in contrast to Quain and Morrison. The former hold that the tendon of the extensor comm. dig. proper (innervated from the radial nerve) is inserted into and extends the first phalanx of the fingers and only helps to extend the middle phalanx, while the reinforcement it receives from the lumbricales and dorsal interossii (innervated by the ulnar nerve) act also upon the middle phalanges but are the *only* ones which have the power to extend the phalangettes. Of course as to shape and relations they all agree that the three sets of tendons fuse into one which divides again into three strips or tendons at the level of the first interphalangeal joint, the middle slip being inserted into the base of the second phalanx while the two lateral slips after uniting by their contiguous margins are inserted into the base of the phalangette.

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## IX.

# PLASTIC OPERATIONS TO ELONGATE CICATRICIAL CONTRACTIONS ACROSS JOINTS.*

BY STEWART L. McCURDY, M. D., PITTSBURGH, PA.

It is a difficult problem, in the surgical management of old cicatrices across joints, about the neck or between the fingers, to liberate the deformed members and control the tissues so as to guard against a return of the same deformity after complete repair has occurred.

The usual method of severing the contracting band at right angles to the line of deformity promises little toward permanent relief of the deformity. The suggestion that an islet be made as a preliminary step, before severing the tissue to the margins, is not satisfactory. All sorts of plastic operations are constantly being done, and some are successful.

For bands across joints, as at the elbow and in cicatrices of the neck or fingers, the practice is to make an incision along the crest of the band from end to end, care being taken to separate the two layers. A lateral cut is made at each end of the first, but on opposite sides, back to the edge of the cicatrix. The angles of the flaps thus made are dissected back for a short distance. (Plate 1, Fig. 1). As the joint is extended, traction is made on the skin at the ends and a condition as shown in Fig. 2 results; with further traction a condition as shown in Fig. 3 is obtained. The margins of the flaps, made by the longitudinal cut, slide upon each other while the end incisions are almost obliterated by the extension. The flaps are liberated as may be necessary to permit complete extension. The edges of the skin, or cicatricial

*Read before the American Orthopedic Association, in Chicago, June, 1908.

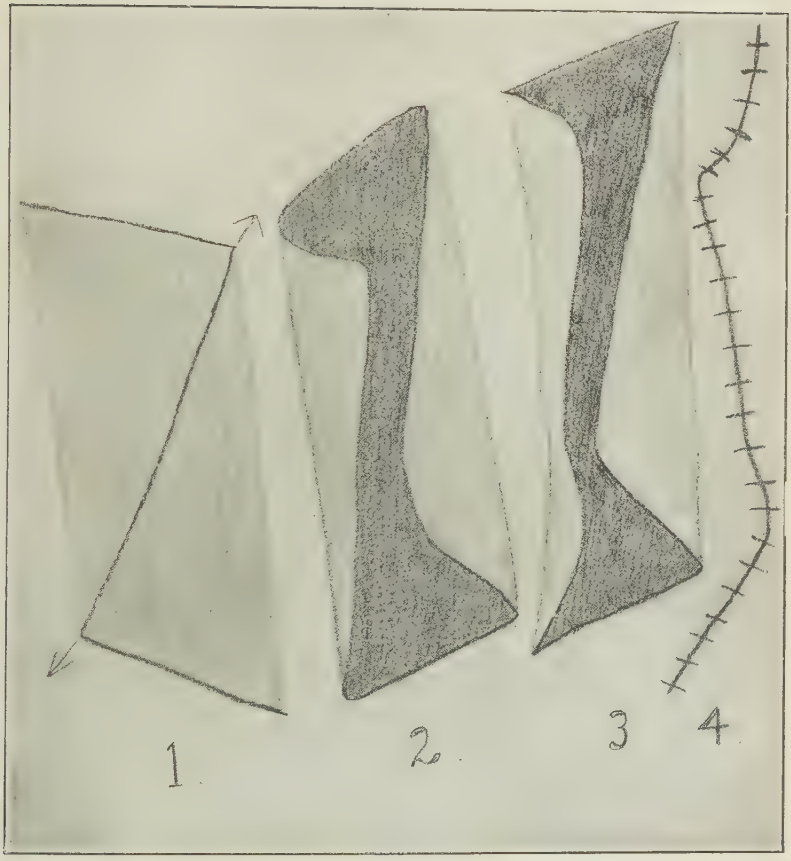


PLATE I.

FIG. 1.—Line of incision and shaded area showing where skin should be dissected from the deeper structures.
FIG. 2.—Showing partial extension of contracted tissues.
FIG. 3.—Showing further extension.
FIG. 4.—Showing complete extension and adjustment of flaps with sutures. Observe that the central part of the wound is covered with skin.

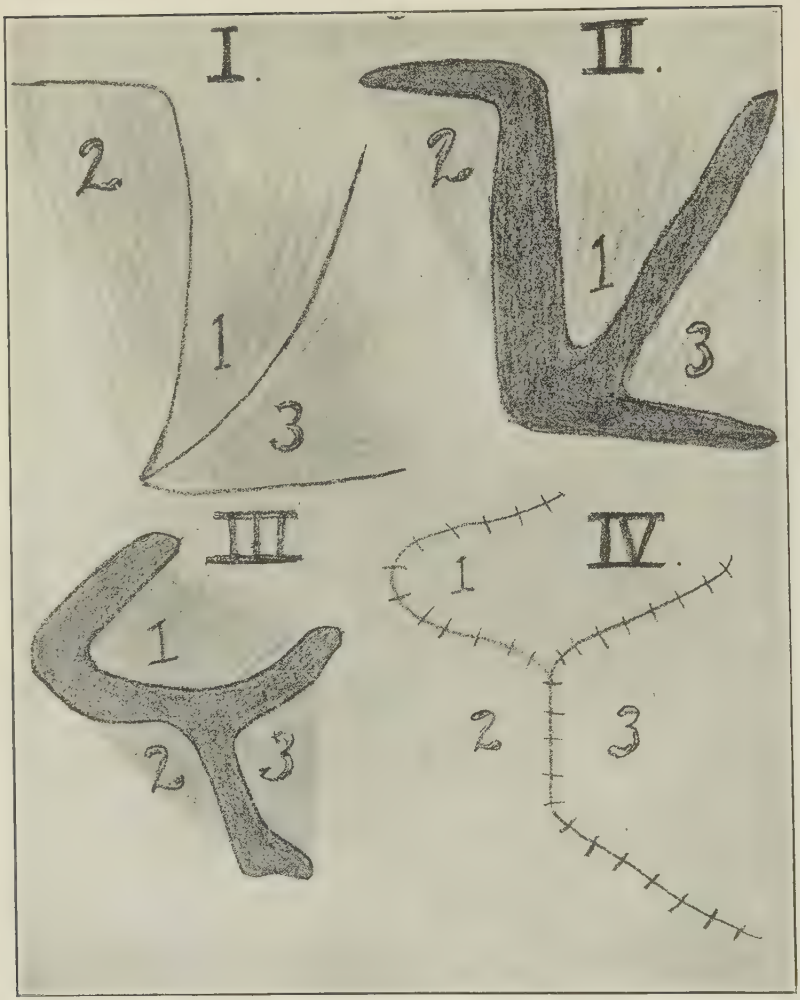


PLATE 2.

FIG. I.—Modified Z incision.
FIGS. II and III.—Intermediate position of the flaps as they were shifted from their original to their new position.
FIG. IV.—Completed suture

tissue as it may be, are brought together and sutured, as shown in Fig. 4. This may not be possible near the ends, but in the center it is usually not difficult. The advantage of this method of operation is that it furnishes covering for the central portion of the cicatrix where it is most needed, and if an uncovered area

PLATE 3.

Burn scar under the arm. Operation by Z method.

is left it is near the ends where the flaps from the neighboring healthy tissues may be switched about to cover it.

Plate 2, Figs. 1, 2, 3 and 4 illustrate an operation recently performed to relieve the contraction of a scar resulting from a burn that drew the chin quite close to the clavicle. The result was quite satisfactory.

It will be seen that the usual Z incision was made and then a second incision from the apex of the lower angle, as shown in Fig. 1. This permitted more freedom with the flaps, allowing

PLATE 4.

Result after complete repair. Observe the Z line of incision across the axillary space

the angular flap to be switched directly across the neck at right angles to the original deforming band, as shown in Fig. 4.

It will rarely be found that an operation can be performed with such technical precision as has just been described, for instance in the case of the little girl, shown in Plate 3 and 4 a

double Z will be observed in the axillary space. This was caused by there being an irregularity in the scar, the internal portion being composed of two folds of cicatricial tissue.

The advantages claimed for this method of operation are:

1. That the central part of the tissues operated upon are always

PLATE 5.

Showing result after operation on another case. Contractions were more extensive that in Fig. 3, extending practically to the elbow. Observe the normal skin in the axillary space which was switched to this position from the chest wall.

covered with normal skin, or healed cicatricial tissue and that repair takes place in the center without further contraction of the original scar.

2. That when sufficient skin cannot be secured to cover the entire surface of the wound caused by the operation, that the

uncovered portions are at the ends of the scar, or at points where there is little danger of cicatricial bands reforming to produce the original deformity.

PLATE 6.

The above pictures represent a case of web fingers following severe burns of the hand from naphtha gas. Operation performed was that described in the other cases. The little finger deformity is due to the fact that the original burn entirely destroyed the joint and bony ankylosis resulted.

X.

# THE TREATMENT OF DEFORMITY FOLLOWING COLLES' FRACTURE.*

BY STEWART L. MCCURDY, M. D., PITTSBURG, PA.

It is not treating a fracture to place an extremity containing a broken bone between two boards and hold them together with a bandage. Neither is it treating fractures to encase a broken extremity in a plaster-of-Paris cast. Two things are essential:

1. A knowledge of the anatomy of the parts involved in the fracture.

2. A knowledge of the laws of levers.

We must assume that all doctors who treat fractures have the first. Unless the surgeon who treats fractures understands the principles of levers and applies them, deformity must result. In order that longitudinal pressure may be made three points for contact must be secured.

A Colles' fracture may be used to illustrate. Here we have a fracture of the radius, a short distance above the wrist with a downward displacement of the fragments as shown in Fig. 1. The lever required is of the first class. The power (P) is the fixed point near the elbow. The fulcrum (F) is placed under the point of fracture, and weight (W) is the hand which must be forced downward to a normal position.

To further illustrate, observe Fig. 2. Here I have shown the usual deformity and the arrows pointing in the direction to overcome the same.

Nature's tendency is toward the formation of straight lines and parallelisms, for if this was not so in a Colles' fracture, instead of the hand dropping down parallel with the long axis of the forearm producing a silver fork deformity, it would continue on upward on a line with the short or lower fragment of the radius and at an angle of 45 degrees with the forearm. See Fig. 6.

*Read before the American Orthopedic Association in Chicago, June, 1908.

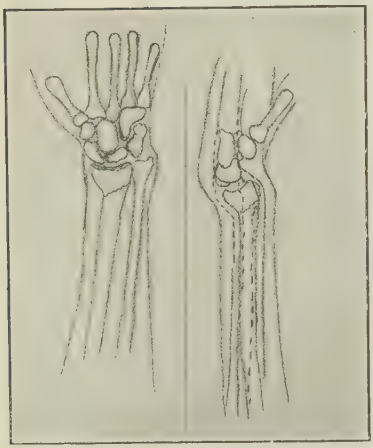

FIG. 1

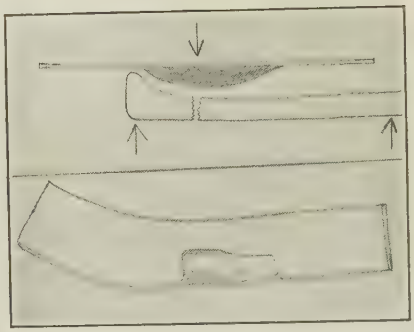

FIG. 2

FIG. 3.—The upper photograph shows the hand in a fixed supination with no power to pronate or move the wrist or fingers. The lower photograph shows the hand, two weeks after the operation, in pronation. Please observe the location of the scar.

This double curve of bone destroys functional usefulness of the member in two ways:

1. The relationship of the head of the radius with the carpal bones instead of being normal, is thrown up to an angle of 45 degrees, thus placing the ligaments of the joint on tension and in a cramped condition which is necessarily painful.

FIG. 4.

2. The tendons on both the dorsal and palmar surfaces crossing the line of fracture instead of having a straight line to traverse and a normal annular ligament to glide through, make two bends, viz., one around under the sharp ends of the broken bone, and again at the radiocarpal joint in the annular ligament where they are impinged upon by the abrupt curve at these points which prevents free motion through the sheaths.

3. The pressure upon the venous return dams the blood back into the hand, resulting in swelling and stiffness of the joints of the fingers.

4. With the radius out of the normal line and shortened, and the head of the ulna fixed to the inside of the carpal bones, the tendency is for the hand to be supinated and thrown forward towards the radius because of the shortening of this bone and the head of the ulna becomes prominent. All of these conditions account for the great pain always present so long as

FIG. 5.

FIGS. 4 AND 5.—Shown in Fig. 3, before and after operation. The above photographs show the final result. Observe the complete flexion and extension of the fingers.

deformity continues, and not found when immediate reduction is effective, and pain disappears after the correction of an old deformity.

5. The ulnar attachment to the wrist being the remaining stable point, acts as a pivot, around which the rest of the hand and forearm revolves and the latter assumes the position of

supination where it remains, so long as the radial fragments are out of position and shortened.

Another complication usually arises especially when the fracture is an inch or more from the joint, viz., the bones at the seat of fracture necessarily tend toward the ulna. As the radius is shortened by the angular deformity, the hand is thrown toward this bone as is shown in Fig. 1.

Diagnosis is not always easy. In some of the cases under observation, a fracture was not made out when marked deformity

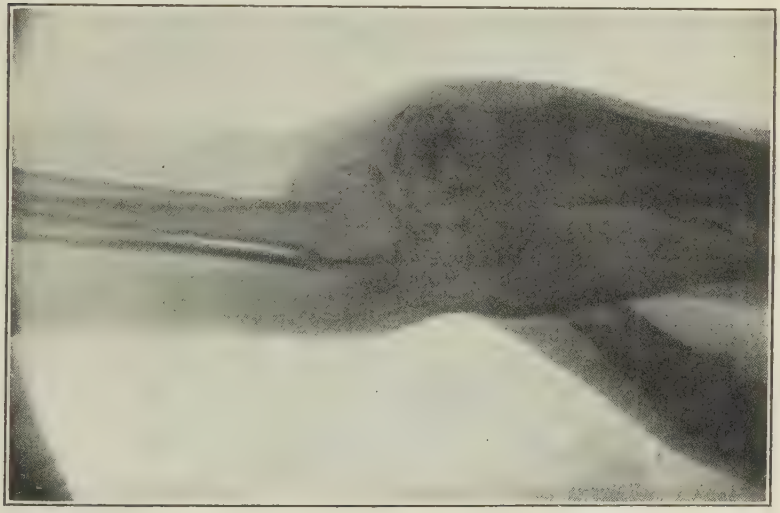

FIG. 6.—The above X-ray picture shows a case of Colles' fracture three months after the accident. The arm was fixed in supination and movements of the fingers were impossible.

(see Fig. 3) was present. When there is any question as to diagnosis an X-ray should be made. Crepitation is rarely found during ordinary manipulation on account of the fact that the tendons crossing the joint hold the roughened ends of the engaged bones firmly together, and it is only attainable as a rule during the act of reduction of the displaced bones. Fixed supination is a most certain diagnostic point. Immobility must not be expected.

*Treatment includes:*

1. Reduction which is accomplished by making traction on the

hand with one hand while the fragments are pushed into position with the thumb and fingers of the other hand. The splint should be prepared as shown in Fig. 7 before reduction and immediately applied. A second straight board is applied dorsally. The pressure points as shown in Fig. 7 must be observed and sufficient padding used to completely maintain a reduction of the fragments.

2. The retention of the fragments in a corrected position

FIG. 7.—Showing method of adjusting the pads between the radius and the lower splint in the upper figure, and in the lower figure the upper splint and bandage applied.

until repair has taken place. This is not difficult when reduction is complete.

For the correction of old deformities following Colles' fracture if two weeks have elapsed after the accident and fixed supination or interference with rotation, an open operation is advisable, the method which I have practised is to make an incision along the outer aspect of the radius immediately over the fracture. In making an incision care must be taken not to sever the cutaneous branch of the radial nerve and to avoid the tendons that may be in the field of the incision as a result of the distorted

position of the forearm. After the field of fracture is reached, it is my custom to use a sharp chisel, and by gently forcing it between the bones they can be separated without difficulty if the fracture is not more than one month old. If older than this it may be necessary to use a mallet. Usually, however, much bony union does not take place within two months.

It will be observed that owing to the deformity the arteries on the palmar surface of the forearm and nerves of both sides, great care must be taken to avoid injuring any of these tissues. After the bones have been separated, the force that should be used in immediate fractures is now applied, which means that the bones are to be forced into a normal position by making traction on the hand with one hand and with the other hand forcing the head of the radius outward and upward so that the dorsal aspect is perfectly straight.

It is a most difficult task to hold these bones in the correct position in fractures that have existed for any great length of time, because all of the tissues are out of line. The palmar splint is first applied as already suggested. The success of perfect maintenance of the correction is due principally to the method of adjusting the pyramidal pad under the seat of fracture. Sometimes great pressure is required even to the production of a superficial pressure necrosis or obstruction of the radial artery for a few days. Under such continued pressure the tissues yield, and once secured is retained without difficulty.

A second pad is placed with the dorsal surface of the carpal bone over the head of the radius. This is necessary in order to increase the leverage to correct the deformity even beyond that which can be produced at the time of the operation, allowing the distal end of the radius to swing free from the splint. A perfectly straight splint should extend near the ends of the fingers to near the elbow. They are now held in position by a snug bandage.

In making the palmar pressure pad for the under surface of the forearm it should not extend across under the ulna, because this bone will be prevented from swinging down around parallel with the radius, and thus greatly interfere with the correction of the deformity.

# EDITORIAL.

When the American Orthopedic Association was founded some twenty years ago the treatment of lateral curvature of the spine was rightly considered a discredit to orthopedic surgery and at the early meetings of the Society the opinion was more than once expressed that no appreciable improvement could be expected in cases where bony deformity was present. The treatment up to this time had consisted in the use of braces, often very complicated, which by their pressure were expected to prevent the deformity from increasing; in the use of gymnastics which were used for the same purpose but which were not clearly understood or formulated, and in the occasional application of plaster-of-Paris jackets put on in suspension which were worn for a long time and which it was hoped would stretch out the spine and hold it in a somewhat improved position. But no adequate, definite surgical attack had been made and the attitude was one of discouragement and demoralization in the face of a pathological condition regarded as practically incurable.

In many parts of the medical world this standard of twenty years ago persists to-day. The instrument maker still sells expensive, complicated and ineffective braces, the gymnast gives a routine of exercises which he does not understand for a condition which he understands less, and in the minds of many there lingers a prejudice against the use of plaster jackets, which prejudice is justifiable if they were to be used as they formerly were. It takes a long time to educate the medical world to a new point of view in the case of an affection where the treatment and prognosis have changed so rapidly under improved conditions as they have in the case of scoliosis.

Twenty years of study, research, and clinical experience have, however, changed the point of view so that it may be said to-day

that although scoliosis is and always will remain one of the most difficult problems of the specialty, it is to-day to be expected that mild cases of bony deformity in young children may be practically cured, that moderate scoliosis may be greatly improved and that even the severe cases may be somewhat ameliorated.

The mechanics of the affection have been studied and illuminated by many writers who have not wholly agreed, but who have all been contributors to our knowledge, the most conspicuous being Lorenz, Albert, Schulthess, Riedinger and Feiss.

The etiology has been better formulated and a most important recent contribution is that of Böhm who called attention to the rôle of congenital vertebral anomalies as causes of lateral deviation. Wullstein's demonstration that structural scoliosis could be experimentally produced in young dogs, who were bandaged in a distorted position for a few months, was of great value.

Our knowledge of pathology has been added to by the careful reports of certain autopsies and studies made on scoliotic cadavera in man and animals. Schulthess has collected practically all information to the date of writing and has made it available to students of German in Joachimsthal's Handbuch der Orthopädischen Chirurgie recently published.

In the matter of treatment we owe much to Wullstein, of Halle, who was the first effectively to advocate and apply really efficient force in the correction of the deformity by means of plaster-of-Paris jackets app ied to the patient in a really corrected position. This position was obtained by the use of head traction running up to 250 pounds and by side pressure produced by adjustable pads running in from a frame in which the patient was suspended. The results of the use of this force were really surprising and it was questioned whether they would be permanent. This question has been answered in the affirmative by Schanz who has twice produced clinical evidence, but the question of the permanence of the results is by no means universally accepted.

Schulthess, Lange and Klapp oppose forcible correction and advocate the use of corrective gymnastics as our chief reliance. Schulthess gives them in apparatus of his own devising, Lange depends on the overcorrection of the deformity by the

use of active and passive exercises given for the most part in simple apparatus, while Klapp depends upon creeping exercises given with the spine horizontal. But in these instances the exercises are prescribed and supervised by a surgeon, they are rational and mechanically sound, and they are given for several hours a day. They therefore have greater efficiency than loose gymnastics given at the patient's convenience by some half-trained masseur.

Thus there are at present two widely differing points of view, both advocated by orthopedic surgeons of great experience. First, the deformity should be corrected by force and in the corrected position a plaster-of-Paris jacket applied temporarily to be changed once or twice so long as further improvement can be secured. Following this, a really effective brace or corset is to be worn for many months and muscular exercise pushed to its limit in competent hands. Second, by the use of muscular exercises and stretching as much can be accomplished and a more permanent and safer improvement brought about.

The correction by forcible jackets will in the end probably appeal more to American orthopedic surgeons because of the community in which they practise. The American parent is unwilling to sacrifice school and social demands to a long continued and wearisome treatment by exercises which will take most of his child's time for months or years to be effective. There are few institutions equipped to give such treatment properly and few gymnastic assistants equipped to carry it out so that aside from any difference in the intrinsic merits of the two systems, about which it is too early to express an opinion, for the present, treatment by forcible jackets bids fair to have a trial in America.

In any event great progress has been made and the treatment of the condition must go forward on one of these lines or on some closely allied one until we obtain still more satisfactory results.

Robert W. Lovett.

# DISCUSSIONS.*

Discussion of paper of Dr. P. W. Nathan on the Etiology and Treatment of Lateral Curvature.

Dr. McKenzie said that it is very commonly stated that lateral curvature does not occur in infants, but that he had seen five well-marked cases in early infancy, of one of which he had a photograph. He wished to show a very simple method by which he is endeavoring to treat this child. He is using a Bradford frame covered with canvas. The child has not been in a sitting posture for months, and will not be for some time to come. He then explained the apparatus in detail.

Dr. Lovett thought that one or two statements in Dr. Nathan's interesting paper should be referred to. In regard to his assumption that there is a definite disease in the bone causing lateral curvature, based upon the occurrence of this disease before and after puberty, Dr. Lovett said that Roth's statistics had been used; but that those of Combe, Atch and Eulenberg show that a great majority of the cases appear before the age of ten years.

Again, Dr. Lovett said that Dr. Nathan had left out of consideration those cases of lateral curvature due to vertebral anomalies. As an instance of another possible cause of curvature, Dr. Lovett spoke of cases following empyema, in which case the curve is always toward the sound side of the chest. A lateral curvature always follows infantile paralysis of the muscles of one side of the back. That curvature may be toward one side or the other.

As to the relation of postural curves to structural curves, Dr. Lovett said that it has been noticed in a large number of cases of postural lateral curvature kept under observation for a number of years by a pupil of Schulthess that a great many were due to structural causes. In no condition that we deal with, he said, are all the members of the community affected. A certain percentage of those exposed to each disease are taken ill with it, for reasons not definitely known, and the remainder escape. The same is true in the case of scoliosis. It seemed to him that it could not be assumed that under given conditions of exposure or mechanical conditions the entire number of those exposed would be affected.

He considered the association much indebted to Dr. Nathan for his

*Papers read at the Chicago Meeting of the American Orthopedic Association and appearing in Vol. VI, No. 3.

extremely suggestive paper. He had simply wished to call attention to some facts that should be alluded to in this connection. He thought that Dr. Nathan's statement regarding the age of the patients should not go unquestioned by the society, as it might produce a false impression.

Dr. Sherman said that he wanted to express his personal obligation to Dr. Nathan for his paper. He had never been able to accept any explanation of lateral curvature based upon posture. A long while ago, Dr. Sherman had written a very crude kind of paper, he said, for another audience, in which he had dealt with this subject in exactly the same way as did Dr. Nathan. It was Dr. Sherman's idea that scoliosis was due to some condition in the bone, and he had accepted rickets as the probable cause; as he had never failed to find in the skeleton of every person treated by him for scoliosis the stigmata of rickets. That gave a basis for a structural change in the bone; and following this would come the definite deformity. Assuming this explanation, Dr. Sherman had adopted a line of treatment in one or two instances that was something like that of Dr. McKenzie, although slightly different. In one patient, a young girl with incipient scoliosis, while he did not change the condition, he controlled it by means of gymnastic exercises. She afterward gave up the exercises and went away. A year later, she returned; and he found a marked change in her condition. What had been formerly barely perceptible, was now an easily observed deformity. He made a frame for her; but instead of having it flat, he had it curved. He put her on it with a Sayre halter, so that she was hanging, thus keeping her spine in extension, and not in flexion. She stayed on this frame for many months, with periods up every day; and he succeeded in stopping what was a very rapidly developing scoliosis. He has tried this treatment since, and has found it very satisfactory. In giving the gymnastics, Dr. Sherman had had the advantage of the assistance of Dr. J. T. Watkins, who took charge of the exercises and the massage. In the case referred to, they took the weight off the patient's spine and kept her nourished to the highest point, so that the condition in her bones would have time to heal; and it did so. Dr. Sherman thought that this plan is worthy of being tried by others.

Discussion of the papers of Mr. Muirhead Little on Fibrous Ankylosis of the Knee-joint and Dr. Rugh, of Philadelphia, on the question, When is Bony Ankylosis Complete After Excision of the Knee.

Dr. Stern asked the speakers what had been their experience in resection of the knee joint for flail knee-joint after infantile paralysis, and in resection for bad position after rheumatoid arthritis. He had had several humiliating experiences after resecting the knee-joints in both kinds of cases, getting no bony ankylosis for a long time.

Dr. Young said that he had been much interested in Mr. Little's paper, and thought that it contained several points that should not go unnoticed. When his attention was first attracted to the operation of osteotomy above

the knee for ankylosis with deformity, he did not think a great deal of it; but, after having performed it on children from twelve to fourteen years of age with satisfactory results, he became much in favor of the Ollier operation. He thought that the removal of the bone from in front constituted a decided advantage, and believed that in the surgery of the future the opening of the knee-joint would be a frequent procedure.

He then referred to a case shown by him during the week in which he had opened the knee and removed a piece of bone, and had then put everything back in the same position after having divided the patellar ligament. He thought that this method gives orthopedic surgeons the same advantage that the abdominal surgeon has in a case of doubt, when the X-ray has not given a satisfactory diagnosis—that of doing an exploratory operation. He considered exploratory arthrotomy would become the operation of choice.

The joint may then be inspected, and any adhesions thoroughly removed, and a better operation can then be done than by any other method. The increased danger of sepsis in the knee-joint over the danger from that source in the abdomen can be overcome by careful technic.

Dr. Rugh, closing, said that he had done this excision of the knee in a case of infantile paralysis in a woman forty-eight years of age. Before attempting the operation he was careful to tell her that she would have union and a firm knee; but that she would probably have to wear a brace for five or six years, owing to the interference with the trophic influences.

He had had no experience in excisions after arthritis deformans, but would expect that union would be delayed in such cases.

In all these cases he believes in promising the patient bony union after a period of about two years. He referred to Ashhurst's article in *International Surgery*, where a case is cited in which contraction took place in an adult seven years after excision. He thought that one should take into consideration the fact that bony union does not occur for one and a half to two years, although there may be fibrous union in four, five or six weeks.

Mr. Little, closing, said, in regard to the question concerning arthrodesis for the contracted knee of infantile paralysis, that he had not done this operation often, because patients did not like the idea of having a stiff knee when the case had been fairly put before them.

As to the question of union, he had found that in infantile paralysis the bones united well. He had, however, one experience in this connection that he thought might be of interest to the members of the association and might serve as a warning to them.

In a case of severe infantile paralysis, in an ankle-joint practically a flail joint, he did an arthrodesis which healed up well. The nutrition of the foot was good and normal, and some weeks after this he did an arthrodesis of the knee. Before he was able to prevent it, the extra pressure on the popliteal vessels produced a gangrene of the front of the foot. This experience he considered not uninstructive.

In regard to Ollier's operation, he had thought that he had discovered this method himself, but later on he found that this view was due merely to the fact that he had failed to make a sufficient study of what was being done by more important surgeons abroad. He did not consider it an ideal operation, because one is not correcting a deformity, but is adding another deformity to the one already existing. It is like the procedure employed in cases of bow-legs, in which an excellent result is obtained by adding another curve to compensate for the one already there.

In relation to what Dr. Young had said about the anterior incision, Mr. Little remarked that the ideal treatment would be to divide the tissues from the back, but that, as surgery has not yet arrived at the point of lengthening the popliteal vein and artery (as perhaps will be done soon), one cannot yet leave the front alone and divide from the back forward. Anterior incision at present, he said, seems to give the best results. A wedge can be removed and the tissues stretched so as to cover the joint.

Discussion of Dr. A. M. Forbes' paper on Non-operative Treatment of Fracture of the Femoral Neck.

Dr. Davis said that inasmuch as the question of treatment had been gone into, he thought that the greatest credit should be given Root for making known the value of the lateral traction method of treatment. In one of his early papers, Root gave credit for the origin of this method to Dr. Maxwell. Dr. Forbes had placed Maxwell's claim as thirty-five years ago, approximately 1873. Dr. Ashhurst, Dr. Davis's assistant, had called his attention recently to the fact that Dr. Phillips, in the *American Journal of the Medical Sciences*, October, 1869, had published an article on the longitudinal and lateral treatment of these fractures, illustrated with cuts. Therefore, if a claim of priority is made, Dr. Davis thought that Phillips should be remembered.

Dr. Hoffmann said that he supposed all orthopedic surgeons are acquainted with Dr. Whitman's method, and he thought that a report of cases treated by this method would be interesting and important. His own experience with this method was that it had given as good results as could be expected from any method in the few cases that he had had. He had treated nine adult cases by it, in all of which he had obtained union, in the last two years and a half. Three occurred in an institution in which there are a number of old people. One, a lady of eighty-two years, treated ten days after the occurrence of the fracture; one, a lady of seventy-six, treated fourteen days after the reception of the fracture; and one, a lady of sixty-odd years, treated nine days after the fracture. In all these the union was perfect. The one eighty-two and the one seventy-six years of age died six or eight months after the treatment, and Dr. Hoffmann expected to get the specimens; but, unfortunately, these deaths occurred while he was away on a vacation and the nurse allowed the bodies to be buried without obtaining the specimens.

Dr. Hoffmann thought that if good union could be secured under such adverse conditions, to get it in nearly all cases must be merely a matter of technic. If an anesthetic is given and traction strong enough to reduce the displacement is exerted, careful abduction performed and plaster applied, there should be nearly 100 per cent. of successes. In the three cases referred to by Dr. Hoffmann the limb was displaced upward from one inch and a half to two inches and a half.

One inexperienced in the application of plaster of Paris, said the speaker, can make the patient very uncomfortable. He has always been careful to place a pad of saddler's felt over the sacrum and the pelvis, extending around the pelvis to the front. The patients are more comfortable by this treatment than with the old traction method. They can be turned and shifted around in bed. Such a thing as a bed-sore should not occur. In the three old persons that had been treated so many days after the occurrence of the fractures there were bed-sores present at the time the plaster was applied, but these healed readily. In the nine cases not one was treated within three days of the fracture. One, a lady of sixty-five years, had been brought a distance of one hundred and fifty or two hundred miles six or seven days after the occurrence of the fracture. She went home about two months ago with a very good limb. Dr. Hoffmann thought the association should feel especially proud of Dr. Whitman.

Dr. Packard said that he had had the opportunity of seeing Dr. Ruth's method carried out, and the results he thought remarkable. He had seen some specimens from cases in which the patients had died where union was perfect within the capsule.

As Dr. Hoffmann had remarked, Dr. Packard said that the double traction method allowed the patients to be moved. Dr. Ruth's patients sit up, and he has no trouble whatever with the lateral traction method.

Dr. Steele expressed his thanks to Dr. Forbes for bringing the subject before the association, and said that he agreed with him regarding methods of treatment. When he entered the profession the subject was engaging great attention, and was being discussed very hotly by surgeons. Many claimed that union by bone was impossible for the reason stated by Sir Astley Cooper. Dr. Steele called attention to one anatomical fact, that in examining many specimens of the neck of the thigh-bone he had observed in a great number a thickening of the capsular ligament running along the under side of the neck, which might be called a figmental ligament. He had seen it nearly as large as his little finger.

Dr. Steele considered fracture of the neck of the thigh-bone to be an appanage of old age, at which period changes take place that cause the thigh to be broken very easily—the pipe-stem fracture. If a slight cause may fracture the bone, it may not rupture the figmental ligament, which thus acts as a splint and keeps the bones together. If this fact is recognized and the patient is confined to bed and slight traction made, union will

probably take place without much trouble. If this is not done, and the patient allowed to be up the weight of the body will cause the ligament to tear and thus shortening follows. Dr. Steele suggested it might be a good thing for Dr. Davis, whom he called the society's anatomist, to look into the matter and see whether such a figmental ligament exists in many cases.

Dr. Forbes in closing said that he had been unable to present his conclusions on account of the limited time at his disposal, but that he felt that no one form of treatment is to be advised in all cases. He thought, however, that Whitman's method is undoubtedly the best in young patients; that for patients who are old or bedridden, the method of Maxwell is to be preferred, but that there still remain some in whom it is inadvisable to employ any form of fixation, adopting, rather, the method of Sir William Benett.

He thought, also, that he ought to accentuate the fact that Sir Astley Cooper had never made the statement that bony union was impossible. What he, Sir Astley, had said was that it is next to impossible, but that to deny that it is possible would be presumptuous.

Discussion of Dr. G. G. Davis' paper on The Treatment of Intracapsular Fracture at the Hip-joint.

Dr. Stewart L. McCurdy, of Pittsburg, said that his experience had not been sufficient to enable him to speak authoritatively about this variety of injury, for it had consisted of but three cases. He could, however, report one hundred per cent. of cures in these three brought about by enucleating the detached head of the femur. To his mind, it was a question of nutrition. If the nail is within the capsule and if the force used has been considerable, the ligamentum teres will be injured. In these three cases this ligament was destroyed, and the head of the nail remained as a foreign body. In one case he succeeded in driving the nail into the center of the head. If the ligamentum teres was all right at the time of the operation, the injury caused by pounding the nail in must have destroyed its nutrition. In all three cases the head of the bone remained in the joint after eight months, a year, and seven months, respectively, as a foreign body, producing a great deal of pain and absolute disability of the extremity. After the head had been removed, these patients all made a good recovery and got around nicely with crutches.

Dr. Peckham remarked that, as Dr. Davis had said, the operation was not standardized, and that a great deal of work had got to be done before it was standardized. He had done his first operation with a bone peg in a little girl, some two years before. The result as to union was perfect; but about the shortening, he did not remember. She was able to run and play afterward and do what other children did. The second case was some time afterward, in an adult, who died of tetanus. In the third case he used a steel-wire nail. As far as he could judge from the X-ray, there never was any union in this case. The patient's pain was relieved, and she was able to walk without crutches. She was walking on the nail, how-

ever; for there was no union. She is a Swede,' and has gone back to Sweden; so Dr. Peckham has lost sight of her. His last case of ununited fracture occurred last spring. He saw the patient a few weeks after the injury, which had been unrecognized. He opened the joint, freshened the edges of the fracture, and put the leg into a position or extreme abduction. He obtained union in this case, but there was shortening. The patient can walk on it, however.

Dr. Peckham said that all who had read Dr. Wilson's case could appreciate the fact that his success was due to his having driven the nail into the acetabulum and having gotten the fragments hard and tight together. He wondered whether this would not be a good thing to do in any case, and asked Dr. Wilson whether he would do it on purpose if he should have such a case to-morrow.

Dr. Willard said that Dr. Magnusen, an assistant of his, had been doing considerable experimental work on the fixation of bone-fractures and lengthening of bones and had made several important advances in this direction. He has finally come down to the use of ivory, because he has found that when an ivory screw is put into a dog's bone, all the portion of the ivory inside the bone itself is absorbed and becomes a part of the bone; while any portion left outside of the periosteum gives trouble, producing either sepsis or inflammatory symptoms. To remedy this, he has invented an ivory screw with a brass head. He first uses a tap with the same thread as the screw, and inserts it down to the point where he wishes the screw to remain. He can then insert the screw without driving, as with a nail. The brass head of the screw is then removed and the ivory cut off level with the periosteum. The screw then becomes a part of the bone, holding it thoroughly in position; and there is no cause for sepsis.

Dr. Willard thought that this invention was very valuable. Removing the brass head prevents the leaving of a hard foreign body beneath the skin to irritate the soft tissues. Ivory is a material as nearly like bone as any that can be secured. The article describing the process had just been published in the *University of Pennsylvania Bulletin*, May, 1908.

Dr. Davis, closing, said, concerning Dr. Peckham's remarks, that he did not see any necessity of his looking any further for a good method. In the one employed in the cases mentioned by him he had gotten good union, although with a small amount of shortening; and Dr. Davis thought that in getting this he had gotten all that one has a right to expect in such cases. In recent fractures, the results are sufficiently good in either the abduction method or the lateral traction method; so that it is only in these ununited cases that there is any operation necessary—and in them only the refresenhing of the edges of the bone.

Discussion of Dr. Stern's paper on Drop Phalangette.

Dr. H. L. Taylor asked how many cases were treated by splinting and how many by operation; also what was the duration of the deformity.

Dr. Stern, in closing, said he had not thought it necessary to read the histories of all his cases. One case would illustrate all. There were eight cases. In three he had found it necessary to suture. The remainder were treated by a splint in overcorrection for six weeks. These were recent cases seen within a few weeks after the occurrence of the injury.

Discussion of Dr. S. L. McCurdy's papers on (a) Operation for Burn Scars and (b) Correction of Deformities Following Colles' Fracture.

Mr. Little said that he wished to mention to the association the value of fibrolysin and other preparations of thiosinamin in the treatment of these burn cases. Burn cases often have a tendency to the formation of keloid wherever an incision is made. He had lately a bad case of burn, in which, wherever he made an incision, keloid developed. It was not until he gave intramuscular or hypodermic injections of fibrolysin that he got any benefit from operations. It is preferable to inject it deeply into the back or some other not very sensitive part. He saw no evil effects whatever from its use. The scars about the patient's face, which was badly burned, markedly diminished. His face had quite a different appearance after five or six weeks of the use of this drug.

Dr. Sherman said that he had had some experience with resection in Colles' fracture, and that there had occurred to him two or three points that he would like to add to what Dr. McCurdy had said. He had never been able to reduce the deformity easily after the fragments had been separated. It had always been necessary for him to get a chisel between the two bones, using the upper fragment as a fulcrum, and making pressure against the lower, to force the lower fragment down. No amount of traction on the hand would accomplish it. Pulling on the hand makes traction come on the long flexor and extensor tendons and so on the internal condyle of the humerus. All the wrist ligaments have to be anatomically loose, in order to give free motion, and if one pulls on the hand, the position of the lower fragment of the radius is not at all affected. It is difficult to hold the fragments in the proper position, after they have been put there. A certain amount of force is also necessary for this; but if it is sufficient to produce sloughing or to interfere with the circulation in the presence of a fresh wound, the result of what has already been done is jeopardized. The slough may become a focus of infection and infect the fracture.

The postural method must be followed to hold the fragments in place, and not pressure. Put the hand in flexion, so as to hold the fragment in place by traction of the extensor tendons around it. Dr. Sherman had had a case of Colles' fracture in a woman, caused by a fall from a horse, the horse rolling upon her and exerting a crushing and flexing force. He put the wrist up in extension, but did not use pressure on its because in all the cases on which he had operated there had been enough reaction from the wound to make him afraid that there might be some infection.. The result in this case proved that there had been none, but still he was alarmed at

the time. He said that he would be much afraid to exert the amount of pressure necessary to hold the fragments in position lest he should do some damage.

Dr. Peckham mentioned that he knew of a patient who had been very severely burned, more than one-third of the surface of the body having been involved. The burns were very deep, and it seemed to be a fatal case. She lay in bed for weeks, and was treated by a competent physician. The surface has now completely healed, and there is no cicatricial tissue whatever. This case was treated with ungentine. This result was very surprising to Dr. Peckham.

Dr. McCurdy, closing, referred to the production of keloid in burns, and said that in Pittsburg there had been a railroad explosion of naphtha in which three hundred persons were burned, twenty-seven of these dying within a week. He had over one hundred cases requiring attention, about fifty of whom he operated on. In all these cases of extensive burn he did not see one of keloid formation; so he would not be afraid of this at all.

As to the sloughing in infection spoken of by Dr. Sherman, Dr. McCurdy said that the photograph of one of these cases, taken three weeks after the operation, showed that nothing of the kind had occurred. In no case had he had either infection or sloughing. In one there was a little necrotic area on the skin, but it was not deep and produced no sloughing. The important thing in these cases is to keep the parts sterile with boric acid.

Dr. McCurdy said that Dr. Sherman was correct in saying that one has to use a chisel to get the fragments in position. In two of his cases the fragments were very sharp. An important step in the procedure is to break the adhesions up thoroughly and make the correction at the time of the operation by placing the part over your knee. It is also important to hold the fragments in the correct position. Dr. McCurdy considers a straight line of so much importance that he would fear to place the hand in such an indefinite position that it might be impossible to control the pressure points and get good results.

# REPORTS OF SOCIETIES.

## INTERURBAN ORTHOPEDIC CLUB.

In the fall of 1907 an interurban club was organized among some of the orthopedic men in the more eastern cities of New England, the Middle Atlantic States and Canada. The cities represented in the membership are Montreal, Boston, Hartford, Rochester, N. Y., New York City, Baltimore, Pittsburg and Washington, D. C. The object of the club was to bring together the members twice each year, not for the purpose of listening to prepared papers, but to see in the orthopedic clinics the methods of treatment employed, any refinements of diagnosis which were being practiced and to hear the results of investigations being carried on in whatever stage they might be. Inasmuch as the meetings are in different places each time, the members are obliged to break away twice each year from the ruts of their own clinics and mingle with others. The effect is necessarily beneficial and already, though only three meetings have been held—the first in Boston, the second in New York and the third in Baltimore, the last in October, 1908—the advantages of the arrangement have been abundantly demonstrated. Similar organizations among medical and surgical men suggested the plan. The meetings last two days, and though a considerable part of the programme is furnished by the orthopedic members, outsiders are invited to present something of clinical and laboratory interest to orthopedic specialists. So successful and beneficial has this proven to those in this circuit that it is hoped other groups of men who are so situated geographically as to make it possible for them to get together in this way will organize for a like purpose.

The October meeting in Baltimore was particularly noteworthy because of the suggestive demonstration by Dr. Sydney Cone at the pathological laboratory of the Baltimore Medical College of the relations of general pathological conditions to special orthopedic problems and the manner in which such relations could be made the subject of practical clinical value. Later in the year the JOURNAL hopes to publish a paper on this subject by Dr. Cone. This was followed by an inspection of the Garrett Memorial Hospital for orthopedic patients and a demonstration of interesting clinical cases. The remainder of the morning was spent at the Hospital for Crippled Children which is under the direction of Dr. R. T. Taylor, where the results of the treatment of Pott's disease by the application of plaster jackets upon the kyphotone was demonstrated, also a very efficient back brace for the treatment of Pott's disease. Von Pirquet's vaccination method of testing for tuberculosis was shown on several children, both the human and the bovine vaccines being employed on the same cases simultaneously. The technic of Beck's method of injecting tuberculous sinuses and the results of such injections in outlining the ramifications of these fistulæ was well indicated in X-ray plates.

In the afternoon Dr. Compton Reilly, at the University of Maryland Hospital, showed another modification of the kyphotone and demonstrated its use in the application of a jacket. Apparatus for the forcible correction of lateral curvature and a special pattern of apron to be used with braces for the treatment of spondylitis, together with numerous clinical cases, were demonstrated.

At the Union Protestant Hospital Dr. Finney showed the results of plastic surgery for the correction of the disfigurements of burns and congenital lues.

Dr. Fayerweather demonstrated several interesting clinical cases, notably two children with tuberculous lesions in the rami of the pubic bones, a rather unusual location.

The entire second day was spent at the Johns Hopkins Hospital where after an inspection of the institution under the guidance of Dr. Hurd a remarkably interesting series of demonstrations and clinical talks were presented. Conspicuous among these was Dr. Barker's half-hour talk on the methods employed in his clinic of treating hysteric joints and Dr. Thomas' demonstration of two cases of congenital amyotonia.

Dr. Halstead reported several cases of the conservative surgery of bone tumors with a discussion of the methods of diagnosis and treatment and a series of X-rays illustrating the pathology and the restoration of structure after extensive subperiosteal resections.

Dr. Bloodgood drew attention to the methods of teaching surgical pathology in the Hopkins Medical School.

Dr. McCallum showed the Hunterian Laboratory where studies in experimental pathology were being prosecuted and research problems in connection with these and kindred subjects could be carried on.

In the afternoon at Prof. Mall's laboratory were shown some of the steps in two or three researches which his assistants had under way—one upon the ossification centers in bone and two others upon the development of blood-vessels in the epiphysis and the bones of the lower extremities.

These were followed by two short but very comprehensive papers upon the uses of tuberculin for diagnostic purposes and the relation of the bovine to the human type of tubercle bacillus. The meeting closed with what was perhaps the most instructive demonstration of all, by Dr. Baer, at which were shown several cases of arthrotomy of the knee for the removal of "solitary lipomata," followed by perfect functional and symptomatic results; two cases of osteoplastic surgery for the cure of relatively benign bone tumors and one or two very promising results after arthroplasty for ankylosis of the hip in healed tuberculosis.

## BOSTON ORTHOPEDIC CLUB.

The first meeting of the Boston Orthopedic Club for the season 1908–09 was held at the regular time for these gatherings, viz., the fourth Wednesday of the month. Dr. Painter read a paper upon "Madelung's Deformity," basing the discussion of the subject upon two cases which were reported clinically. One had been operated upon by Dr. J. E. Goldthwait for the relief of symptoms, the lower end of the radius and ulna having been osteotomized and then the fragments were moulded so as to re-establish approximately the normal relations of the radius and ulna to the carpus. The functional result five years after has been nearly perfect. The second case was one of less severity and has been treated by leather wristlets, massage and resistive exercises. A review of the literature and citation of the various theories of the production of the deformity were given. Two

additional hitherto unreported cases of this deformity were presented in the discussion by Drs. Hammond and Adams.

Dr. James Sever made a preliminary report upon an investigation carried out upon animals at the surgical laboratory of the Harvard Medical School. The object of the study was to demonstrate the best methods of performing tenotomy by investigating the reparative processes of tendons and their sheaths. The results of this research will appear later in the publications of the Surgical Department of the Harvard Medical School. Dr. Sever was assisted by Drs. J. A. O'Reilley and D. V. Panhallow. A brief abstract of this paper follows.

This paper was a preliminary study and concerned itself with "the effects of tendon resection and regeneration with and without the replacement of the tendon by some suture material." The effect of the presence or absence of the tendon sheath was also under consideration. Lange and Vulpius have done most of the work along these lines, and only recently has any been attempted in this country. Hoffa, Nicoladoni, Borst, Seggl, and Rydygier have added to the literature. Lange, in 1902, reports upon a case which had been operated upon two and one-half years before. In this instance he found the quadriceps tendon had been replaced by a fibrous mass as large as a lead-pencil. This was not surrounded by any true tendon sheath. The silk threads were not destroyed but had become infiltrated by the new growth. The microscopic appearances were gone into in considerable detail. Instead of silk ligatures, such as were employed by Lange, Ritter has attempted to substitute a vein, which was to act as a guide along which the tendon should regenerate. This also served as a tendon sheath after the tendon bad been reformed. Seggl states that new tendon is developed after tenotomy by the organization of the blood which is poured out from the cut sheath. Mencière carried out a research in 1906, using silk threads folded in the form of a skein which he interposed between the ends of the resected tendon. In two months be obtained a functioning muscle. Six months later he killed the animal and examined the new tendon. It was larger than a lead pencil and larger than the tendon of the opposite leg. It had the appearance of a tendon and was not adherent to surrounding tissue. He found the silk thread had been penetrated, absorbed and replaced by fibrous tissue. In the experimental work of the writers cats were employed, and a series of seven experiments were performed, which are reported in detail. In the first two cases no attempt was made to close the tendon sheath. In these there was no adherence of tendon to the skin at subsequent observation. In the third case the sheath and the tendon were removed together and there was here adhesion of tendon to skin at seat of operation. New tendon formed in five months. In the fourth case resection of tendon; sheath not excised and not closed. Silk movable in sheath. Strong tendon regenerated along the line of silk sutures. In the last two cases, one had the sheath sewed after the tendon resection and one did not. In neither of these was any suture material used to bridge over the gap. In the case where the sheath was closed the ends of the tendon were joined and the new tissue was adherent to the sheath. In the other there was no trace of a new tendon growing across.

The second meeting of the Boston Orthopedic Club for the season 1908–09 took place November 25. The first paper was a preliminary study of a series of excisions of the shoulder by Dr. C. L. Scudder. All of these were done at one clinic, viz., the Massachusetts General Hospital, and the larger proportion of them were performed upon traumatic cases. Several, how-

ever, were for tuberculosis. The functional results were in the main satisfactory both to the patient and the operator, though they were far from perfect. As a rule, those done for tuberculosis were better than those done for trauma. With the exception of two recent cases (less than six months) they were all seen and reported upon from two to five or more years after the operation. The existence of pain or deformity and disability resulting therefrom justify the operation. After a more careful analysis of the cases they will be reported in full by Dr. Scudder. The second paper was by Dr. Royal Whitman on "Injuries to the Neck of the Femur in Early Life," shortly to be published. The reader referred to the history of the development of knowledge on this subject and divided the cases as they appear clinically into groups.

He then discussed the differential diagnosis of epiphyseal separations and fractures of the neck and described in detail the treatment of these conditions. He reported briefly a number of cases.

## ORTHOPEDIC SECTION, NEW YORK ACADEMY OF MEDICINE.

There have been two meetings of the Orthopedic Section of the Academy of Medicine in the season of 1908–09. The first meeting was held October 16, 1908, and was a joint meeting of the Pediatric and Orthopedic Sections.

*Subject.*—The Paralyses of Early Life.

*Papers.*—1. The Causative Factors. Royal S. Haynes, M. D.

2. Differential Diagnosis. E. G. Zabriskie, M. D.

3. Treatment:

(a) Electrical. T. H. Romeiser, M. D.

(b) Mechanical. Wisner R. Townsend, M. D.

(c) Operative. Reginald H. Sayre, M. D.

General discussion by Drs. V. P. Gibney, H. L. Taylor and others.

*Second meeting, November 20, 1908. General Clinical Meeting.*

*Presentation of cases:*

a. Genu recurvatum following transplantation of hamstrings. Henry Ling Taylor, M. D.

b. Hematoma of the thigh. Virgil P. Gibney, M. D.

c. Sarcoma of radius successfully treated by the mixed toxins of erysipelas and bacillus prodigiosus. William B. Coley, M. D.

d. Two cases illustrating the results in ambulatory treatment of rigid weak foot. Arthur H. Cilley, M. D.

e. Case of fracture of neck of femur. Arthur H. Cilley, M. D.

f. Case simulating psoas abscess. Charles H. Jaeger, M. D.

g. Case of coxa vara. Royal Whitman, M. D.

h. Case of Still's disease. Walter W. Strong, M. D.

i. Two cases of Volkmann's ischemic paralysis treated by Jones' splint method. Reginald H. Sayre, M. D.

j. Case of unilateral congenital dislocation of hip, reduction, hypertrophy of bones of leg. Reginald H. Sayre.

A general discussion followed. Dr. Ashley reported a case of fracture of both bones of the forearm where he used a Parkhill instrument on the radius and an intermedullary aluminum splint on the ulna, with a good result.

FRED H. ALBEE.

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The Editors hope that in the future other orthopedic clubs and societies may furnish the JOURNAL with reports of their meetings.

In Philadelphia at the present time orthopedic papers are generally reported in the *Annals of Surgery* under the Society Reports of the Surgical Academy.

## MEETING UNDER THE AUSPICIES OF THE BOSTON MEDICAL LIBRARY.

BOSTON, MASS., December 2, 1908.

The State of Massachusetts has stood for many years at the forefront of most movements which have related to the public health. In the organization of a State commission for the regulation and improvement of the conditions under which child labor is permitted the State has followed close on the lead of the National Association, which has for its object the promotion of legislation making unlawful the employment of children in trades and industries, and looking to the establishment of conditions in this country similar to those prevailing in Germany, where industrial education for children is compulsory, the amount of time spent in this manner being regulated in accord with the individual requirements.

With a view to enlisting the active cooperation of the medical profession in this subject, a meeting was arranged, over which President Charles W. Eliot, of Harvard, presided. He made a brief address in which he outlined the scope of the National Committee for the Regulation of Child Labor, and then introduced Mr. Lord, the secretary for New England of this committee, and Mr. Gettemy, the chief of the Bureau of Statistics of Labor in Massachusetts.

These gentlemen described the conditions under which children were employed in many industries at the present time and in the past, and cited instances of the deterioration of races where child labor had been permitted. They gave brief reviews of the existing legislation on these matters and told of the powers possessed by the State police, truant officers, and the various commissions to conduct investigations and compel obedience to existing laws. Statistics covering the increase of population since the enactment of any legislation of this character were cited, together with comparative figures of the numbers of children employed in Massachusetts in the periods before and after the passage of this legislation.

The third paper of the evening was by Dr. J. E. Goldthwait, upon Poise and Carriage in Relation to Physical and Economic Efficiency, as well as in its relations to ill health. The paper brought out forcibly the relations of the poise and balance of the body among those ancient peoples whose superiority over their neighbors is a matter of history. The same thing was shown in the illustrations of various statues as well as photographs of forceful individuals of modern times. The effect of bad poise was next shown upon a series of individuals who had no organic disease, but whose individual efficiency must have been impaired by their posture and, lastly, the association of bad position with various pathological conditions was demonstrated, and the conclusion was drawn that practitioners of the art of medicine in its various branches were remiss in their duties if they failed to bear in mind this matter of poise in the treatment of many pathological conditions. Independently, of any disease it was plainly responsible for symptoms which were often overlooked. Though the whole matter concerns the orthopedic surgeon but little more than it does other members of the medical profession, its bearings upon general problems in medicine and surgery are perhaps a little more readily perceived by them, and for this reason should be pushed the harder by individual members of this association and by the association

as a whole. For this same reason orthopedic surgeons should lend their aid to all State and national movements to further the restriction of child labor, for the employment of minors under the conditions which prevail in those occupations where their assistance is now sought tends to develop in them many of the conditions for which later on the specialist is called in, and preventive measures are as much a part of our specialty as of any other department of medicine. Furthermore, the interest of this association should extend broadly into all fields where we may advance the interests of the human race by increasing the physical potentiality of the individual, and coincidently, if not consequentially, his or her moral and mental force.

# ABSTRACTS.

## I. TUBERCULOUS LESIONS, OF BONES JOINTS AND TENDONS. GENERAL ARTICLES ON TUBERCULOSIS.

Recurring Tuberculous Polyarthritis. K. Schäffer. Abstracted in Journal A. M. A., Aug. 29, 1908, p. 800.

Resection of Elbow with Retention of Function. V. Schmieden. Abstracted in Journal A. M. A., September 19, 1908, p. 1040.

Dangers of Calmette's Ocular Rea tion. T. H. Butler. Abstracted in Journal A. M. A., Sept. 5, 1908, p. 871.

Dangers of Ocular Reaction to Tuberculin. R. Polland. Abstracted in Journal A. M. A., August 22, 1908, p. 717.

Articles on the Ocular Tuberculin Reaction. Journal A. M. A., September 19, 1908, p. 1027.

Primary Tuberculosis of Mesenteric Glands. H. Mächtie. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1115.

Spondylitic Abscesses in Posterior Mediastinum. E. Finck. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1115.

Resection of Elbow with Retention of Function. W. Lossen. Berliner klin. Woch., Aug. 31, 1908, XLV, No. 35.

Present Status of the Relation of Bovine to Human Tuberculosis. C. J. Whalen. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1110.

Calmette's Ocular Reaction. C. Reismann. Australasian Medical Gazette, July 20, 1908.

Bier's Hyperemia. C. W. M. Poynter. Western Med. Review, August, 1908.

Technic for Resection of Elbow. A. Isaja. Abstracted in Journal A. M. A., October 17, 1908, p. 1384.

Three Cases of Paraplegia. J. M. Clarke. British Med. Journal., September 12, 1908.

Tuberculosis of the Bones and Joints. William W. Cadbury. Fourth Annual Report of the Henry Phipps Institute, Feb. 1, 1906, to Feb. 1, 1907, page 203.

Fresh Air Work for Surgical Tuberculosis. Henry Ling Taylor. Post-Graduate Twenty-fifth Anniversary Volume, 1908.

Retroperitoneal Tuberculous Glands and Their Relations to Spinal Symptoms (Tabes Mesenterica). Charles F. Painter. Abstract and Discussion of Paper in Journal A. M. A., Oct. 17, 1908, p. 1364.

Resection of Tuberculous Elbow. John A. Hartwell. Meeting of N. Y. Surg. Society, April 22, 1908; reported in Annals of Surgery, September, 1908, p. 454.

Dangers of Hyperalimentation of the Tuberculous. M. Labbe. Abstracted in Journal A. M. A., Oct. 31, 1908, p. 1554.

Ocular Tuberculin Reaction. J. H. Sequeira. Abstracted in Journal A. M. A., Nov. 14, 1908, p. 1736.

Ocular Tuberculin Reaction. L. F. Frissell and P. Van Ingen. Abstracted in Journal A. M. A., Nov. 21, 1908, p. 1816.

Tuberculous Immunity and the Treatment of Tuberculosis with the Immune Blood of Tuberculous Patients. C. Spengler. Abstracted in Boston Med. and Surg. Jour., October 29, 1908, p. 596.

Tuberculous Articular Rheumatism. E. Melchior. Abstracted in Journal A. M. A., Nov. 14, 1908, p. 1741.

**The Cutaneous Tuberculin Test in Children.** By Feer, Heidelberg. *Muench. med. Wochenschrift*, 1908, p. 6. Abstracted in the *zentralblatt fuer chir. und mech. Orth.*, July, 1908, by Ewald.

Three hundred and forty-four children from 0 to 15 years were vaccinated with Koch's old tuberculin. Among them twenty-five were recognized to have distinct symptoms of tuberculosis; all these showed positive reaction except one case with cachectic peritonitis. Among two hundred and ninty-one non-suspicious cases twenty-seven showed positive reaction. Among one hundred and twelve suckling babies only three showed positive reaction; the number of cases with positive reaction increases with the age.

Feer agrees with von Pirquet that positive reaction proves tuberculosis. Only cachectic cases and cases with miliary tuberculosis and meningitis often show no reaction in the last stage. Calmette's ophthalmo reaction tried by Feer in fifty cases gave doubtful results, while the cutaneous test never was wrong. The autopsy has confirmed in many cases the diagnosis made by the test.—*H. Bucholz, Boston.*

**Genu Recurvatum Following Hip Disease.** By Bilhaut, Paris. *Ann. de chir. et d'orth.*, XX, No. 8, p. 225. Abstracted in the *zentralblatt fuer chir. und mech. Orth.*, July, 1908, by Ottendorf.

By thoroughly examining genua recurvata following tubercular hip disease Bilhaut has found that not the loosening of the ligaments but change in the bones of the knee-joint is the cause of this affection. This osseous curvature is produced by the paucity of lime salt in the bones as is always apparent in the whole leg in patients with hip disease. Bilhaut thinks it probable that tuberculosis settles only in bones damaged by bad nutrition. In applying braces and in traction bandages the overextending of the knee has strictly to be avoided.—*H. Bucholz, Boston.*

**The Dangers of the Ophthalmo-reaction and How to Avoid Them.** By A. Wolff-Eisner. *Wiener klin. Wochenschrift*, 1908, Nr. 33.

Neither Teichmann among 1500 cases (Med. Klinik, 1908, Nr. 26) nor W. among more than 3000 cases have ever seen any bad result. He considers any bad results and damages mentioned in the literature are due to mistakes in its administration. To avoid mistakes he gives the following rules: 1. Technical. Good and fresh preparations must be used. He recommends the preparations from the Serum labaratory Ruete-Enoch, in Hamburg.

2. No initial or reinstallations are to be made when local symptoms of tubercular affections in the eyes or in their neighborhood, such as lupus of the eye-lashes, are present, a slight conjunctivitis, however, is not a contra-indication. Therefore W. considers the patients of the eye clinics very unfitted for this reaction, in general practice, however, he thinks the reaction may be recommended now as reliable and without any danger, if errors of technic will be avoided. *H. Bucholz, Boston.*

**Treatment of Hip Disease in the Beginning.** By Lannelongue. *Deutsche med. Wochenschrift*, 1908, Nr. 8, p. 359.

In a paper, read before the Akadémie de médecine in Paris, L. expresses his astonishment that Calot has not mentioned him as the author of the following methods recommended by L. many years ago. 1. He puts his patients in the bed in horizontal position with an extension on the leg. He rejects plaster of Paris casts, because they do not correct the position of the joint, and injure the mobility. The reviewer agrees with this recommen-

dation in general; it is, however, not always possible to treat such patients in bed, and for these cases a careful use of a cast can hardly be avoided and will be of only slight disadvantage.

2. He makes injections in the joint with a mixture of iodoform, ether and creosote in oil. The ether spreads the drug over the whole surface of the joint, the iodoform checks the noxious action of the tubercular bacilli, creosote produces scar tissues (wirkt sklerosierend). It should be added that we know from the research work of Heile and others that the most important effect of the iodoform is made by the chemotactic attraction of leukocytes the ferment of which accelerates the resorption of the tubercular abscess.—*H. Bucholz, Boston.*

**Tuberculosis Other Than Pulmonary, Treated with Tuberculine.** Report of Cases. By G. R. Pogue, Greely, Colo. *Medical Record*, August 29, 1908.

He reports a few representative cases, from several classes treated with tuberculin in combination with other treatment, which seem to have been very good results.

The joint cases referred to had a combination of the Bier and tuberculin treatment. It would have been interesting to have had a more minute history and statement of treatment of the cases given. It is interesting to note the improvement in these cases and to learn what a combination of fresh air, tuberculin and other methods such as that advised by Bier will do for joint tuberculosis.

His conclusions are as follows: "Tubercle bacilli preparations seem to have a double action when introduced into the circulation of a tuberculous individual, especially in the early stages of the disease: 1. The stimulation of the production of tuberculo-opsinins, which opsinins have a certain unknown action on tubercle bacilli that are free in the tissues, so preparing them that they are readily taken up and presumably destroyed by the phagocyting leukocytes. 2. The causing of a hyperemia around the tuberculous area, thus aiding the process of encapsulation. In both cases the small dose is called for.—*John Dunlop, Washington, D. C.*

**The Treatment of Joint Tuberculosis.** By E. H. Ochsner. *Illinois Med. Jour.*, July, 1908.

Strongly advocates the use of tuberculin injections in the treatment of joint tuberculosis, whether or not secondarily infected with other germs. The control of the opsonic index must always be used. Advises also the use of Beck's bismuth-vaselin paste. Condemns the opening and infecting of cold abscesses.

Under tuberculin treatment joint tuberculosis heals in a manner fundamentally different from that seen when tuberculin is not used, there being no increase of connective tissue, no sclerosis and no calcification. If connective tissue has already formed, this "vaccination" treatment has the power to cause its absorption.

For immobilizing the joints, plaster-of-Paris casts reinforced with wheat gluten bandages fulfill every requirement and are far superior to any form of splint or brace. These casts are applied over stockinette, apparently with no protective padding whatever. All joints should be immobilized in the "positions of equilibrium." These being given as 175° for the knee, 10° abduction and 5° of flexion for the hip, and less than a right angle for the foot. Gradual correction of deformity in partially ankylosed and very

painful hips by means of Buck's extension is condemned, and immediate correction under an anesthetic is indorsed.

"Joint tuberculosis, if thus approached, becomes one of the most satisfactory and easily managed of affections," is the optimistic conclusion of this article. No practical details of any kind whatever are given.—*E. W. Ryerson, Chicago.*

**The Treatment of Joint Tuberculosis.** By E. H. Ochsner. *Jour. Michigan State Med. Soc.*, Aug., 1908.

Same article as above.

**The Calmette Reaction as a Diagnostic Aid.** By Clarence P. Oberndorf, M. D., New York. *New York Medical Journal*, September 5, 1908.

The author reports eighty-three cases from the general medical service in Bellevue Hospital of Dr. W. Gilman Thompson. The method of instillation was by a platinum loop 2 mm. in diameter, sterilized in a flame, dipped in the solution and applied to the inner can thus of the eye, the preparation used being a 3 per cent. crude tuberculin solution furnished by the New York Board of Health. The advantages of this method of instillation are its cleanliness, the small quantity of the preparation used and the certainty of its reaching the proper spot. The three cases of conjunctivitis following this administration all quickly subsided under cold boric acid compresses. Of the eighty-three reactions, thirty-seven were positive and forty-six negative, generally corresponding well with the clinical interpretations and laboratory findings. In one case in which tubercle bacilli were found the reaction was negative, a case of a boy of nineteen with pleurisy with effusion, acute rheumatic fever, chronic endocarditis, and acute pericarditis; in this case the negative reaction may have been due to the fact that the tuberculin did not reach the inner canthus. In many of the cases a positive reaction called attention to important factors when the other tubercular evidence seemed slight, notably in one case which was first diagnosed as an old hip fracture; after finding gonococci in the vaginal smear it was considered a gonorrheal hip, but, after a positive conjunctival reaction, was proven at autopsy to be a tubercular hip. The author concludes that the test is not infallible, but as reliable as throat cultures in suspected diphtheria. Widal reactions in suspected typhoid, or blood counts in obscure febrile cases. He considers it more accurate than auscultation and percussion, simpler than the hypodermic reaction and negatively more satisfactory than a negative sputum, feces or urine.—*C. W. Hoyt, Rochester, N. Y.*

**The Tuberculo-ophthalmic Reaction.** By Frank L. Christian, M. D., Elmira, N. Y. *New York Medical Journal*, September 5, 1908.

The author reports 500 observations. He used one drop of a 1 per cent. solution of tuberculin, prepared by dissolving a tablet obtained from a laboratory in 5 minims of sterile salt solution. The few cases of severe conjunctivitis resulting all yielded to simple treatment; there were no febrile reactions or systemic disturbances. There was no relation between the intensity of the reaction and the severity of the lesion, and no moribund or advanced cases reacted. One hundred normal individuals after the first instillation gave no positive reaction. Out of 210 cases with various tubercular affections there were 194 positive reactions. A series of sixty cases of various forms of "rheumatism," including acute articular rheumatism with endocarditis, subacute articular rheumatism, and gonorrheal arthritis,

there were thirty-six positive reactions, the one case of gonorrheal arthritis giving a positive reaction. The author's conclusions are as follows: 1. The test is rapid, simple and convenient. 2. It should not be repeated in the same eye. 3. A positive reaction may follow repeated instillations in a normal individual. 4. It should be applied only to a normal eye. 5. It is of value in diagnosis of early lesions; it is usually negative in advanced cases of tuberculosis. 6. The reaction itself is not conclusive, but with other signs furnishes confirmatory evidence. 7. It occurs in conditions other than tubercular and must still remain secondary to a careful physical examination.—*C. W. Hoyt, Rochester, N. Y.*

**The Conjunctival Tuberculin Test.** By Geo. Mannheimer, M. D., New York. *New York Medical Journal*, September 5, 1908.

The author discusses the conjunctival tuberculin test, touches briefly upon the theory of the reaction, and considers important points in its administration, likewise its relation to the skin and subcutaneous tests. After mentioning a few cases in which mild constitutional symptoms have followed the reaction and a few instances in which chance nontubercular conditions have disturbed the test, he briefly considers the contraindications to the test which are any threatened or existing eye diseases (except refractive errors), traces of previous disease, scrofulous children, hay fever, colds and the administration of iodides. Too severe reactions should be treated like those due to other causes; by this means the author thinks that accidents can in all cases be avoided. The few severe reactions observed by the writer all passed off without mishap, and all followed the use of 1 per cent. precipitated tuberculin. This preparation the author thinks unnecessarily expensive, uncertain in strength and more apt to be followed by untoward effects; he prefers 1 per cent. old tuberculin. The reaction is usually negative in advanced or moribund cases. When for any reason it is desirable to make a second test, the other eye should always be used, otherwise a positive reaction will be obtained even in a nontuberculous individual. The author concludes that the reaction has fulfilled all reasonable expectations, but still has discrepancies. It will never replace a careful physical examination. He ends by quoting in detail the method of application of this in conjunction with the two other tests by Dr. Baldwin, of Saranac Lake Sanatorium, which he considers most thorough and conservative.—*C. W. Hoyt, Rochester, N. Y.*

**Double Coxa Vara and Genu Valgum of Tuberculous Origin.** By Rene Horand. *Revue d'orthopédie*, Nov., 1908, p. 505.

The case illustrates the sequels of old osteoarticular lesions, inflammatory in origin which never suppurated and which belong to the class of arthro-osteomalacia of adolescence.

The osteoarticular softenings were certainly the product of an infection, and as our patient died with typical tuberculous visceral lesions we consider it perfectly legitimate to consider the infection tuberculous in nature, especially in view of our previous publications and those of Poncet.

The patient was an adolescent of nineteen years affected with coxa vara and double genu valgum who died after long suffering of multiple tuberculoses. The visceral tuberculoses were as follows: 1. Tuberculous peritonitis and suppurating mesenteric glands.

2. Tuberculous strictures of the intestines.
3. Enormous cavities in the lungs.
4. Epididymitis of both testicles.
5. Bony lesions of one hand and one foot.

6. A slight kyphosis. This was not due to Pott's disease, but to a spina bifida occulta.

7. Extension of the hips was difficult the thighs being flexed on the pelvis and the knees touched, there being double genu valgum. The legs and feet were rotated inward.

The coxa femoral articulations were completely transformed, especially that on the right side. The cotyloid cavity had disappeared and resembled that of the shoulder.

There was an abscence of the femoral neck, the head was flattened and ovoid with its long axis anteroposterior. The great trochanter projected upward above the head of the femur. The angle of inclination was diminished. The angle of declination was increased, making an angle open in front of double that of a normal femur. The spur of Merkel (Calcar Femorale) was increased to 2 cm. in thickness.

There was a disappearance of the head in the neighborhood of the insertion of the ligamentum teres with a deep rarefying osteitis and subperiosteal eburnation that reminded one of a dry arthritis. The bony fibres had evidently become distorted by a process of partial osteomalacia making a semicircle smaller than normal and flattened on its inner quadrant. The neck almost disappeared and its angle of inclination lessened. The head softened by the partial osteomalacia flattened like an umbrella or mushroom, its long axis adapting itself to the cotyloid cavity and the neck was twisted with its angle of declination abnormally open in front.

The deformation was secondary to a pathologic process and not solely a congenital malformation as might be inferred from the coexistence of the spina bifida. Prof. Taboulay considered that the peculiar character of the bony deformities might be accounted for by the condition of the patient. The attitude was horizontal, bedridden, with prolonged flexion of the thighs persisted in for several years and also causing the double genu valgum. The affection was probably one of osteoarthromalacia of tuberculous origin, an opinion concurred in by Prof. Poncet. It is an unique example of double coxa vara with coincident double genu valgum and is one of the first cases of coxa vara and genu valgum whose origin or cause can be attributed to tuberculosis.—*Gwilym G. Davis, Philadelphia.*

**Diaphyseal Tuberculosis, Spina Ventosa of the long Bones.** By Vignard and E. Mouriuand. *Revue d'orthopédie*, Nov., 1908, p. 481.

Tuberculous disease of the diaphysis is not extremely rare, but that of the big long bones is of less frequency than that of the little long bones as instanced in the case of spina ventosa of the fingers. Tuberculous disease affecting the short bones—spina ventosa—has been described by Boyer, Cloquet, Berard, Nelaton, Rognetta and Villepin. In 1873 Parrot described a case which, in addition to three foci affecting the small bones, exhibited foci in each of the ulnæ. Volkmann reported one of the ulna and Broca one of the fibula. Poncet, in 1904, described a case under the name Tuberculous Rheumatism which, in addition to other tuberculous lesions, showed a tuberculous affection of the ulna.

The authors in 1905 observed a case similar to that of Broca involving the lower two-thirds of the fibula, one of the authors has likewise reported a case in which the clavicle was involved.

*Etiology.*—The disease is a localized tuberculosis and may be primary or secondary, often the osseous lesions are the primary ones. The majority of the cases are seen between the ages of one and four years. It then becomes

rarer between the ages of five and twelve or fifteen, but the authors have seen cases of eighteen and thirty-three years. Boys are more often attacked than girls. Traumatism here as elsewhere probably plays some part in determining the localization of the affection.

*Onset.*—The disease begins slowly with progressive augmentation of the volume of the bone. The disease begins in the marrow. It is affected by what Parrot has named "gelatiniform atrophy." The fatty and medullary cells disappear, leaving fibrils, vessels and nerves bathed in a serous, albuminoid liquid. Irritation of the subperiosteal region increases bony deposit.

*Stage of Full Development.*—The bone is augmented in volume; the tumefaction being at variable points on the diaphysis. It is most often near an epiphysis and about 3 or 4 cm. in length. In the clavicle the whole length may be involved. The enlargement is fusiform fading at its ends into the healthy tissue. The surface may be smooth or rough and fistulæ may be present. If the bone is divided the medullary canal is seen to be enlarged. The bone can sometimes be cut with a scalpel because at the enlarged parts the osseous tissue has become very thin, friable and easily depressed. The bone is never so much thickened as to cause it to be considered as the cause of the enlargement. The spongy tissue is completely destroyed. New deposits of bone occur on the exterior, but the destruction on the interior progresses. Patches of bony tissue, both spongy and compact, may thus be detached from the rest of the bone and from sequestra in the midst of a fungous mass. Sometimes the shell of bone and periosteum become perforated and sinuses may form.

*Symptoms.*—The onset is slow and insidious.

*Period of Tumefaction.*—Then tumefaction occurs, followed by ulceration. There is no pain nor interference with motion. It is usual for advice to be sought on account of the swelling. Rarely there may be slight elevation of temperature and some pain. These, however, are of short duration.

The ulna is most often the bone affected. The radius is also sometimes involved.

In the inferior extremity the lower third of the fibula has been most often affected. Finally the clavicle has been diseased.

The osseous tumefaction is localized and the adjoining parts show little tendency to become involved. At this stage the skin is normal in color, nonadherent and the bone feels hard and resistant without fluctuation. Later the bone becomes thinner and can be depressed. There is no pain even on palpation. The character of the trouble is shown by radiography. The enlargement is seen to be osseous with the center of the bone clear and empty and the diseased shading off into the healthy parts.

*Period of Ulceration.*—The skin becomes tense and shiny and fluctuation may be felt at a greater or less depth. Ulceration occurs and a fistula forms. This may occur any time within a year. A probe introduced into the fistula passes into the central cavity. The affection which Broca described under the title of Infiltrating Osseous Tuberculosis of Nursing Children corresponds with this disease.

*Complications.*—These are mainly extensions of the osseous lesions: 1. The disease may involve the remainder of the diaphysis not, however, toward the epiphyses, but excentrically toward the skin surface. 2. Rarely the tendon sheaths become involved, especially following curetting. It is very exceptional for the adjoining articulations to become affected.

*Other Localized Tuberculoses.*—Parrot has observed in these cases a tendency to a more or less generalized tuberculous process. There may arise

spina ventosa of the hands or feet, osteitis of the jaws, cutaneous or subcutaneous gummæ, multiple adenopathies, articular disease, etc. These make the prognosis grave.

*Diagnosis.*—The existence of other foci should be looked for in order to establish the character of the affection.

Hereditary syphilis must be eliminated. In this latter affection suppuration is the exception and the rapid disappearance of the swelling under the mixed treatment settles the question. The history also should be scrutinized. Osteo sarcoma may also be mistaken for it. The progress, however, is rapid, the tumor softer and of variable consistency.

Multiple exostoses (de croissance) are but little liable to be misconstrued. Their evident tumor character, round, hard and projecting with more of the peculiarities of the tuberculous disease will enable them to be identified.

Osteitis is accompanied by pain and inflammation which is greater than in the tuberculous variety and will serve to differentiate them, also radiography.

*Treatment.*—The limb should be immobilized in a plaster cast with a window over the affected area. A soft compress may be used or other bland treatment, but punctures are not to be resorted to. Later, if the disease progresses, the bone should be opened and any sequestra present removed. The cavity can then either be packed with gauze or filled with the iodoform mass of Mosetig Moorhof. The limb is to be kept in a plaster-of-Paris dressing. General treatment, cod-liver oil, superalimentation should be given with attention to hygiene and a visit to the seashore. (A history of five cases follows.)—*Gwilym G. Davis, Philadelphia.*

**Tuberculous Rheumatism.** By Arnaud. *Revue d'orthopédie.* Nov., 1908, p. 511.

Tuberculous rheumatism presents itself in different aspects, sometimes it is a simple, slight arthralgia, in others it is an acute mono- or polyarthritis with effusions into the joint and with as marked general symptoms as occur in the most virulent infectious diseases.

While sometimes fugacious the articular manifestations may also be prolonged and assume a chronic state. This constitutes chronic deforming rheumatism and is seen in all stages between complete restoration of function and absolute ankylosis. It is a characteristic of tuberculous rheumatism not to confine itself to the joints alone, but to attack muscles, aponeuroses and the viscera either, all at once or successively. Frequently these rheumatoid attacks leave sequelæ in the shape of fibrous scleroses and ankyloses, muscular and aponeurotic contractions which may render diagnosis difficult. A case is cited of a man aged thirty-one years with painful contractions of the left forearm and hand. There was no family history of arthritic disease or tuberculosis. The patient himself had no history of previous disease nor of gonorrhea nor syphilis. Two years previously he had malaria which was cured by quinin in four months leaving him thin and anemic. Two months later he began to have rheumatic pains in the right arm and right leg. The limbs were edematous and painful, especially in the neighborhood of the joints, they could not be moved. He had a little temperature, anorexia and headache. Treated with salicylate of soda, the acute symptoms subsided, but some pain and stiffness persisted. A year ago there was another attack, more marked, affecting the left leg. It remained flexed on the thigh. This attack lasted five months. Soon after there was a third attack involving the left arm. The shoulder was first

attacked, then the elbow and then the wrist. Pain and temperature were marked and the hand and forearm were red and edematous. He was given the salicylates, antipyrin, quinin and arsenic in large doses, and in about three weeks the attack began to decline. There was left limitation of movement of the elbow; the hand was flexed on the forearm and the fingers markedly extended. The muscles of the forearm were contracted, the tendinous cords being readily felt. In the joints of the hand there seemed to be a dry ankylosing arthritis.

A radiograph gave no further information. There appeared to be a sclerosing myositis affecting mainly the flexor muscles and producing contractions. The extensors were unaffected. There was no paralysis and partial movements were retained. There was no reaction of degeneration. There were enlarged lymphatic glands in the neck and also an irregular enlargement of the right testicle. Heart and lungs healthy. The serodiagnostic tuberculous test by the method of P. Courmont was doubtful. The diagnosis of tuberculous rheumatism was made because of the existence of tuberculous glands and testicle; it was not a single articulation that was attacked; the muscles and aponeuroses were profoundly involved; the lesions were chronic; ultimately ankyloses occurred and contractions; finally the localization of the lesions in different tissues together with the sclerotic tendency of those lesions established the diagnosis.

The case is an example of the inflammatory affection of a sclerotic tendency described by Poncet and Leriche (Academie de Médecine, seance du 12. mai, 1908).

The result confirmed the diagnosis. Under the influence of rest, abundant nourishment and reconstructive treatment the general health of the patient markedly improved. The local condition remained the same. Under anesthesia the deformities persisted. Forced movements, accompanied by cracking of adhesions, musculo-tendinous and periarticular were made and the limb put up in plaster. Severe pain followed these maneuvres and lasted for five days, after which the patient commenced to move his fingers more freely.—*Gwilym G. Davis, Philadelphia.*

**Clinical Experiments with Marmorek's Serum in Sixty Cases of Pulmonary Tuberculosis.** By F. Köhler. *Deutsche med. Wochenschr.*, 1908, No. 29.

In order that no adverse criticism should be encountered, advanced cases only were taken in which no results from physical and dietetic treatment could be expected. Of these sixty cases three were treated five weeks, four from fifty to sixty days, two from sixty to seventy, five from seventy to eighty, six from eighty to ninety, twenty-two from ninety to one hundred, ten from one hundred to one hundred, and twenty, and eight from one hundred and twenty to one hundred and ninety-four. Frey's method of injection per rectum after evacuation of the bowels (in the morning) was employed. In two cases the injection was intravenous: 5 cm. were retained, 10 cm. caused collapse. In the majority of cases 5 cm. were injected daily for ten days, followed by an interval of ten days. In the second series 5 to 10 cm. were used. In the second class of cases 5 to 10 cm. were injected every second day without intermission.

The results obtained varied. Some cases showed a clearing up of the pulmonary involvement without general improvement, some general improvement with pulmonary improvement; many gained in weight, but not parallel with the other improvements. Of the sixty pulmonary improve

ment was noticed in twenty-two; unchanged, eighteen; disease progressed in twenty. Marked general improvement, fifteen; diminution of subjected symptoms, twenty-one; cough, expectoration, etc., unchanged in twenty-six. Death during or shortly after treatment, four. Seventeen gained from three and one-half to four kg. in weight. Sixteen gained less than three and one-half kg.; fourteen showed slight gain, five were unchanged, and eight showed a loss. Disappearance of tubercle bacilli was noticed in one case. One case which was free from bacilli upon admission developed them while under treatment. Hemorrhage appeared during treatment in seven, one terminating fatally. Whether or not this hemorrhage was caused by the serum is a question, but that the serum cannot control it is demonstrated. In no case was there improvement after hemorrhage appeared. Two cases showed severe psychic disturbance. There was a rise in temperature in twelve cases which had been normal till then, rise in three which already had slight rise, fever uninfluenced in five, reduced in two.

The serum cannot be called a positive cure. There was improvement of the lungs, of general health, of subjective symptoms and weight, but never in equal proportion. Change for the worse and bad local affections were never prevented.—*Alexander E. Horwitz.*

**Marmorek Serum.** By Paul Glaessner, Berlin. *Deutsche med. Wochenschr.*, 1908, No. 29.

G. draws his conclusions from ten cases of joint tuberculosis treated by the serum. In nearly all the cases other treatment was omitted. Improvement followed in eight. The patients ranged in age from three to twenty-one. The joints involved were the shoulder, ankle, wrist, spine, fingers, etc. In five the injections were subcutaneous at the breast; in five rectal. They were given at intervals of three to four days, and eight to ten days between each series of ten to fifteen injections. Reaction followed four times in the subcutaneous and once in the rectal injections. This reaction varied from a slight malaise to severe disturbance. In two cases there were swelling of the eye-lids, lips and ears, an itching eruption over chest, arms and back, and disturbed sleep. Rise of three degrees Centigrade in one case, with loss of appetite, irregular bowels, congestion of mucous membranes of mouth and nose. This lasted four to six days and entirely disappeared. The injections were omitted during this period.

The injections were never more than 5 cm. subcutaneous, nor 10 to 20 cm. rectal. Since greater reaction followed the subcutaneous, G. considers this method to be more efficacious. Good results, however, followed without any reaction. The reaction may be due to the frequency with which it is given, since it occurred only where the intervals were too short. It cannot be ascribed to idiosyncrasy, since in no case did it follow the first injection. It usually appeared after the fourth. The intervals should not be less than three days, and greater if the patients reacts to the first four injections. If the slightest reaction occurs, we should wait several days until after the entire disappearance of symptoms before the treatment is resumed.

The improvement noted in all but two cases was recession of periarticular swelling, diminution of pain, improvement of function, diminution of secretion, increase in healthy granulation, closing of fistulæ and betterment of general health. He thinks this is due to a specific effect of the serum. In no case did the serum have any permanent ill effect. The two cases which did not improve were unusually severe.—*Alexander E. Horwitz.*

**Conservative Treatment of Surgical Tuberculosis by Injections of Camphor-naphthol.** By Wreden. *Zeit für orth. Chir.*, Band XXI, Heft 4, 1908.

This preparation affects a tubercular tissue in two ways: First, by its bactericidal properties and, second, by the favorable influence due to its irritative reaction as brought about by the local active hyperemia. Author discusses the treatment of twenty cases by this method. His conclusions are as follows: First, the treatment of surgical tuberculosis by camphor-naphthol injections, in conjunction with good fixation of the affected organs, gives better results than all other methods of treatment. Second, camphor-naphthol injections are absolutely without danger if the preparation is only injected into the abscess cavities and into the fistulas, and if for interstitial injections there are used emulsions of camphor-naphthol with glycerin in the ratio of one part camphor-naphthol to 5.2 parts of glycerin, according to the age and general condition of the diseased individual. Third, the interstitial injections of camphor-naphthol and the evacuation of abscesses are absolutely painless if the part affected is first anesthetized by means of a 1 per cent. cocain solution.—*Henry O. Feiss, Cleveland, O.*

**Pathogenie du Rheumatisme Tuberculeux.** By A. Poncet. *Gaz. des Hôp.*, 1908, No. 88.

This paper presents some general considerations tending to establish the fact that a large group of cases of "chronic rheumatism" are of tuberculous origin. It is largely abstracted from the author's contribution to a series of twenty-five vols., by Chantemesse, Poncet, *et al.*, forming the "Bibliothèque de la tuberculose," at present in press.

*Clinical.*—Just as in the case of gonorrheal infections, so in tuberculous patients the appearance of an arthritis is by the "law of coincidence" to be attributed, in the absence of proof to the contrary, to an extension of the preexisting infection. Such joint manifestations are very frequent in tuberculous subjects. It is not rare to see a joint of purely "rheumatic" appearance develop into one of the characteristic fungous type. Very suggestive also are the transient joint symptoms when, by heroic medication, the cough and expectoration are suddenly suppressed in chronic phthisis; or the increase or decrease in coexisting "rheumatic" joint symptoms inversely with improvement or aggravation of the pulmonary conditions in consumption.

*Experimental.*—Certain clinical procedures may yield evidence. The subcutaneous injection of Koch's tuberculin has produced arthralgia and acute synovitis. Lannelongue, using it for treatment of lupus, observed that it produced generalized rheumatic phenomena in an infant.

*Pathological and Bacteriological.*—Results of recent researches collectively permit the classification of "rheumatic" tuberculosis under three heads: (a) With specific reaction. The synovial membrane is studded with granulations, ordinarily in association with fungoid changes or pyarthrosis, but occasionally existing as an independent lesion. It is, however, a rare form. (b) Without pathological, but with bacteriological specificity. The nature of the affection is demonstrated by production of tuberculous lesions in animals inoculated with the joint fluid. Very rarely the tubercle bacillus is isolated directly from the joint. (c) Without pathological or bacteriological proof of the tuberculous origin. This is much the largest class. Only isolated clinical features suggest the etiology, but in many cases these are so striking as to form a considerable chain of evidence, among them, the transformation of an ordinary "rheumatic" joint into a white

swelling or the reaction of such a joint to tuberculin. It is conceived that in such cases the changes produced in the joint have been purely inflammatory—paratuberculous, comparable to the parasyphilis of Fournier. It has been shown that attenuated tubercle bacilli can excite simple inflammatory reactions, and we can no longer adhere to the idea of the specificity of the tubercle itself, this being only the most highly differentiated of the lesions produced. This fact has been fully established by different observers in regard to the action of the bacillus on a variety of the body tissues, such simple inflammatory reactions being styled by Bernard and Gougerot "nonfollicular lesions," and by Poncet "inflammatory tuberculosis."

Considering this inflammatory form fully demonstrated, Poncet discusses the mode of its production. Some would hold the lesions to be the result of secondary invaders—bacillus coli, streptococcus, etc. "Have these been demonstrated *in situ* or in the blood of tubercular rheumatics?" "Are vultures on the field of battle the victors because they appear after the defeat?" The reaction in the joints may be due (1) to diffusible toxins produced by tubercle bacilli in a distant focus; (2) to "adherent toxins" produced *in situ* by attenuated bacilli; (3) to direct action of attenuated bacilli so few in number as to escape any but the most scrutinizing search. It is impossible as yet to determine, but the latter is the probable mode of action. The important fact remains, however: the tuberculous origin of the "rheumatism."—*Roades Fayerweather, Baltimore.*

**Ocular Tuberculin Test of Calmette.** By N. Bannister. *Iowa Medical Journal*, August, 1908.

The author states that certain other conditions are capable of giving the reaction; notably acute articular rheumatism and typhoid fever. The reaction does not occur in health. It is a valuable means of diagnosis. Its reliability and its ease of application should lead to universal use in doubtful cases. The author's paper is followed by an interesting discussion on this subject.

**Serum Diagnosis of Tuberculosis: the Tuberculo-opsonic Index, the von Pirquet Skin Test and the Conjunctival Test.** By Mary C. Lincoln. *Journal A. M. A.*, Nov. 21, 1908, p. 1756.

This paper presents a comparison of the relative values of the three tests noted in the title by a large number of clinical experiments on tubercular and nontubercular cases of different classes. The technic used is described and the result and tabulated, and the author also presents a table showing the percentage of positive reactions of the tuberculin tests by different workers.

She concludes that the percentage of positive reactions with the three tests is about the same, *i. e.*, from 80 to 90 per cent. in favorable cases and 30 to 40 per cent. in unfavorable ones. That the more advanced the disease the smaller the per cent. of positive reactions and that the intensity of the reaction does not consistently follow any rule, but tends to be greater in cases of less advanced disease. The conjunctival test should be used carefully.

**Early Restoration of Function after Excision of the Tuberculous Elbow-joint.** By G. G. Cottam. *American Journal of Surgery*, April.

Dr. Cottam reports one case of excision of the elbow which he treated for three weeks by fixation in the extended position and then took off all support and encouraged free use. In eight weeks after the operation the patient was able to return to active labor. Cottam urges surgeons to encourage early motion in these cases.—*A. H. Crosbie, Boston.*

## II. PARALYTIC DISEASES AND THEIR DEFORMITIES. TENDON SURGERY.

New Method of Tendon Suture. C. Ritter. Abstracted in Journal A. M. A., September 5, 1908, p. 876.

Infantile Paralysis Treated by Tendon Transplantation and Nerve Anastomosis. A. P. C. Ashhurst.

Trans. of Philadelphia Academy of Surgery, April 6, 1908; reported in Annals of Surgery, September, 1908, p. 470.

Treatment of Deformities of Infantile Paralysis. W. Truslow. Abstracted in Journal A. M. A., Nov. 7, 1908, p. 1642.

Polioencephalitis Infantilis. E. K. Shelmerdine. American Medicine, September, 1908.

Acute Poliomyelitis Following Tonsillitis. Kendall Emerson. Boston Med. and Surg. Jour., Oct. 15, 1908, p. 500.

Relations Between Congenital Muscular Defects, Infantile Disintegration of the Nuclei and Progressive Infantile Dystrophy of the Muscles. Ziehen. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1115.

Bulbar Paralysis Followed by Progressive Muscular Artrophy. J. F. Little and T. J. Bokenham. Abstracted in Journal A. M. A., October 10, 1908, p. 1283.

**Lesions of the Cauda Equina Without Disturbance of the Sensory Nerves.** By Lussatti, Ferrara. Il Policlinico, 1908, No. 12. Abstracted in the *Zentralblatt fuer chir. und mech. Orthop.*, July, 1908, by Buccheri.

L. reports two cases in which lesions of the last spinal nerve-roots produced motor symptoms without anesthesia. The symptoms of the first case, due to a traumatic lesion of the epiconus, were zonular pains along the nerve tracts, paralysis of the tibial and peroneal nerves. Recovery.

In the second case an early form of an hereditary lues produced paralysis of the detrusor vesicæ without any trouble with the sphincter or the sensibility of the bladder. Quick recovery by the use of mercury. This case represents probably a lesion of the lowest sacral nerve-roots which supply the detrusor through the ganglion hypogastrium, while the sensory nerves of the bladder, which have their origin higher, and those which supply the sphincter through the ganglion mesentericum inferius have not been injured. —*H. Bucholz, Boston.*

**Late Lesion of the Ulnar Nerve.** By H. Brassert. *Muench. med. Wochenschrift*, 1907, Nr. 53, p. 2641.

Oppenheim in his text-book of nerve diseases has called attention to a strange form of retarded paralysis of the ulnar nerve, produced by callus or scar tissues due to old fractures or other lesions of the elbow. B. reports a case of such late paralysis. A forty-eight-year-old man, who had worked hard and may have had sometimes occasion to injure slightly his elbow, as it is also seen in the other cases reported in the literature; he complained of pain in the right arm for one year and felt weakness and sense of numbness in the fourth and fifth fingers of his right hand. Examination showed atrophy in the muscles supplied by the ulnar nerve and a partial degenerative reaction. Patient has had a severe septic arthritis with deforming alterations in both elbows thirty-two years ago following scarlatina. Both elbows especially the right one, show clinically and in the X-ray picture enormous proliferations on the condylus externus.—*H. Bucholz, Boston.*

**Anterior Poliomyelitis.** By Irving D. Steinhardt, M. D., New York. *New York Medical Journal*, August 8, 1908.

The author gives a very orderly, systematic and well-condensed exposition of this subject, evidently having carefully reviewed the literature. Under

the heading of Etiology, he mentions any sudden lowering of the child's bodily temperature as an important predisposing cause, as from lying on damp ground when heated. Under Diagnosis the author considers that any sudden attack of fever and vomiting without apparent cause in a child, particularly after exposure to extreme heat or dampness, should be closely watched for ensuing paralysis. Symptomatic treatment should aim to reduce congestion by laxatives, mild sedatives, counterirritation or cold on the spine, and rest in a lateral position. The nutrition of the muscles should be maintained by massage, heat, hydrotherapy and galvanic electricity as long as the muscles will contract to it. Deformity should be prevented by moving the affected joints twice daily through their normal range, and by support with apparatus. After all tendency to recovery has ceased, help may be gained by tendon transplantations, doing as simple an operation as possible, and holding the part in an overcorrected position by plaster. Arthrodesis also is often of benefit.—*C. W. Hoyt, Rochester, N. Y.*

**Volkman's Ischaemic Paralysis.** By George D. Stewart, M. D., New York. *Annals of Surgery*, October, 1908.

Presentation of a typical case occurring in a boy seven years old, who had received a supracondyloid fracture of the right humerus, followed by a pressure ulcer from splints just below the elbow.—*R. R. Fitch, Rochester, N. Y.*

**Obstetrical Paralysis. A preliminary report of two cases treated by nerve dissociation.** By Karl Osterhaus, M. D., Norfolk, Va. *New York Medical Journal*, Nov. 7, 1908.

The author says that "later experiments go to prove conclusively that it is caused by excessive traction or tension on the nerve-roots of the plexus."

"The pathology of the lesion, as revealed post mortem or by operation, is the same as that of similar injuries to nerves elsewhere. The injury varies from a simple stretching of the nerve-fibers to complete laceration of the plexus. As usually seen, however, it consists of a stretching of some of the fibres and a tearing or unraveling of others at different levels, the fifth and sixth nerves being most often affected.

"The supporting connective-tissue perineural sheath with its contained blood-vessels is the first to give way under excessive strain, causing hemorrhage which infiltrates the nerve substance. Organization of the resulting blood-clots, which occurs before regeneration of the nerve-fibers begins, forms scattered bands of connective tissue around the nerve bundles, constricting them, thus effectually preventing their regeneration . . . In nerve lesions due to overstretching, the peripheral fibers are always more injured than the central ones."

"The three varieties of obstetrical paralysis, depending on the site and extent of the lesion, are upper-arm paralysis, lower-arm paralysis and total arm paralysis."

The prognosis in the upper-arm cases may be said to be good where operative measures are employed, while in the cases involving the whole arm much improvement may be hoped for, though perhaps no great amount of usefulness

In the early stages the treatment should be the same as in anterior poliomyelitis, so as to eliminate as far as possible temporary conditions. Such therapeutic measures as electricity, massage, etc., being employed together with apparatus to prevent distortion. According to different authors, a period of from six months to two years should elapse.

"The technic of the operation commonly employed for the relief of this condition described by Tayler is as follows:

"An incision is made along the posterior border of the sternocleidomastoid muscle extending obliquely downward and outward from the junction of its lower and middle thirds to the clavicle at the junction of its outer and middle thirds. The platysma and deep fascia are divided, exposing the omohyoid muscle and suprascapular vessels. These are retracted downward or divided between double ligatures, as are also the transvenus colli vessels, which are found just below the middle of the wound. The incision is carried through the layer of fat covering the deep cervical fascia, under which lies the brachial plexus . . .

"The injured nerves are usually more thickened than the healthy nerves, in most cases at the junction of the fifth and sixth cervicals . . . These masses of scar tissue should be excised with a sharp scalpel. The use of scissors or forceps is to be condemned on account of bruising the nerve ends and regeneration interfered with. The nerve ends are brought together by lateral sutures of fine silk, passed through the nerve-sheath only. While the sutures are being tied the neck and shoulders are approximated to prevent any tension on the nerve union. Cargile membrane is then wrapped about the anastomosis to prevent ingrowth of connective tissue." . . .

The operation employed by the author was *dissociation* of the nerve-fibers at the point of lesion, rather than an excision, thereby saving any remaining normal fibers intact.

"To this end the nerve junction was carefully lifted on two fingers, the nerve-sheaths having been previously split up for a considerable distance above and below, and with a fine sharp tenotome the nerve-fibers constricted by the cicatricial bands were thoroughly dissociated, Cargile membrane was then applied loosely, and the wound closed. The return of function which followed was almost startling in its rapidity." . . .

A report of his two cases follows, somewhat in detail.

"In concluding, the writer thinks that this method is of distinct advantage in many cases where extensive resection would be of doubtful benefit. Undoubtedly much less harm is apt to be done by separating the fibers than by excision of the cicatricial masses. Dissociation by relieving the pressure and constriction of the nerve-fibers opens up new pathways for their regeneration."

The first case reported was a girl of sixteen, with upper-arm paralysis, operated on November 8, 1907. The other case was a girl four years of age, with upper-arm paralysis, operated on November 14, 1907. At the time of the report, read at the Medical Society of Virginia, October 20, 1908, there was a distinct improvement both in electrical reaction and motion of the previously paralysed muscles. The later stages of these cases will form the basis of a subsequent report.—*John Dunlop, Washington, D. C.*

**Acute Anterior Poliomyelitis in the Adult with Exhibition of Case.** By LaSalle Archambault, M. D., Albany, N. Y. *New York Medical Journal*, August, 8, 1908.

After speaking of the comparative rarity of anterior poliomyelitis in adults the author reports a case of a man of forty years of age who was suddenly seized with headache, fever, vertigo and vomiting. On the fifth day his left arm became suddenly paralyzed, on the next day the right leg lost muscular power, closely followed by the left leg, right arm and muscles of neck and trunk. There was retention of urine, which disappeared after two days. The neck and trunk muscles soon regained their power. The paralysis was most marked in the left arm and right leg, in which extremities all tendon reflexes disappeared. There was marked atrophy of the right leg, and some atrophy of the left arm, but slight wasting of the right arm. There

were no deformities. At the outset there was much pain in the legs and left arm, which gradually disappeared. There was also more or less generalized muscular tenderness, especially over the nerve-trunks of the legs, corresponding to areas of greatest paralysis. There were no objective sensory disturbances.

The author discusses the diagnosis of this case; although, according to many authorities, it would be a case of multiple neuritis, he considers this incompatible with the rapid appearance and development of such widespread and severe parslyais, and the rapid occurrence of widespread degenerative atrophy. However, he considers that there must be some peripheral involvement in addition to the spinal cord process, namely, a peripheral motor neuronitis, his theory of the pathology of the whole process being that of a rapidly-spread leptomeningitis by means of the blood, the process extending both into the gray matter of the anterior horns, and in the opposite direction along the anterior nerve-roots and their sheaths, and thus along the motor neurons. The author then discusses the bacteriology of acute anterior poliomyelitis, and decides that it is still in the hands of the future.—*C. W. Hoyt, Rochester, N. Y.*

**Volkman's Ischemic Paralysis.** By Alfred S. Taylor, M. D., New York. *Annals of Surgery*, September, 1908.

The author considers this type of paralysis to be of more frequent occurrence than the limited amount of literature concerning it would indicate. The condition is covered in detail by the author. His summary is here presented in full. "Ischemic paralysis is essentially a myositis resulting from prolonged absence from the muscles of oxygenated blood. Muscle substance is replaced by fibrous tissue in proportion to the severity of the case, with a corresponding degree and rigidity of contracture.

"The nerves are frequently involved, either primarily from the ischemia and pressure, or secondarily from compression by the cicatricial mass. This form of paralysis occurs nearly always in the forearm after too tight dressings have been applied to fractures near the elbow. The great majority of cases occur in children from three to twelve years old.

"*Diagnostic Symptoms.*—Early onset of severe pain and swelling, simultaneous appearance of rigid contracture with the paralysis of the muscles, causing the characteristic 'claw hand.' The simultaneous appearance of the contracture with the paralysis differentiates these cases from palsies due purely to nerve lesions.

"Severe cases may result from six hours of tight compression. Evidence of damage to nerves should always be sought.

"Prophylaxis is most important. No tight dressing should be used on any fractures, especially when they are near the elbow-joint in children. In all dressings allowance must be made from traumatic reactionary swelling. Frequent inspection of dressings must be made for the first two days after injury.

"When the lesion occurs, dressings must be removed, the fracture neglected for the time being, and attention paid solely to the return of muscle nutrition and function.

"Nonoperative treatment consists in the use of massage, electricity, vigorous passive motion, etc.

"Operative treatment. Lengthening of the tendons of the shortened muscles sufficiently to permit simultaneous extension of the wrist and fingers.

"Resection of both bones of the forearm is a simpler and probably a better

operation. Enough is removed to permit full extension of the wrist and fingers.

"Either operation relieves the excessive tension and favors muscle regeneration.

"In all cases damaged nerves should be properly cared for.

"After-treatment consists of physical therapeutics, and must be vigorously and systematically applied.

"Prognosis is, on the whole, unfavorable; complete cure is rare; improvement often comes only after months or years of steady work.

"Results are better the earlier and more vigorous the treatment."—*R. R. Fitch, Rochester, N. Y.*

**Arthrodesis and Tendon Transference in Paralytic Club-feet.** By J. P. Lord. *Surg., Gyn. and Obstet.* April, 1908.

Paralytic club-foot is a prevalent disability. There is a great tendency to relapse after ordinary treatment. Arthrodesis improves the strength and ability to support the body. It is especially applicable to flail joints. Tendon transference and arthrodesis can often be used together to advantage. He recommends early arthrodesis in children. His experience shows that nothing is gained by waiting.—*A. H. Crosbie.*

**Infantile Paralysis.** By Robert W. Lovett, M. D., and W. P. Lucas, M. D., Boston. *Jour. Am. Med. Assn.*, Nov. 14, 1908.

In this article the authors have analyzed 635 consecutive cases from the records of the Boston Children's Hospital between January 1, 1897, and January 1, 1908. The analysis has been made with reference to etiology, associated diseases, age, season of onset, distribution of paralysis, relation of onset to paralysis, resulting deformities, etc., and much of the data is arranged in tables which adds to interest and value.

In discussing treatment the authors have taken up the subject in general very comprehensively, but have not attempted to tabulate results from this series as "No tabulation of results from so large and varied a group of cases would be practicable or of great value."

Treatment during the siege of onset and after the paralysis has become established are both considered. Under the latter heading the mechanical and operative measures for the prevention of muscular stretching and muscular contraction, which are two of the chief causes of resulting deformity, are discussed and their value emphasized.

The principles of tendon transplantation, arthrodesis and nerve anastomosis are considered in brief.

Two points of especial importance are brought out:

*First*, that more muscles often seem to be paralyzed than are really involved, and after the overstretched muscles have been restored and the contractions overcome, additional active power is developed.

*Second*, that tendon transplantation and other operative measures often prove unsatisfactory simply because the after-treatment, such as massage and muscular education, and active development are neglected. No attempt is made to describe the technic of the therapeutic procedures.—*John L. Porter, M. D., Chicago.*

**On the Operative Substitution for the Paralyzed Quadriceps Femoris with Special Reference to the Transplantation of the Iliotibial Tract.** By Naegeli. *Zeit. für orth. Chir.*, Band XXI, Heft 1–3, 1908.

Author covers the work which has been done in the past for paralysis of the quadriceps and reports on fourteen transplantations. In one of these

he transplanted the sartorius, in the rest he transplanted the iliotibial band. The anatomy of the tensor fascia lata described. The chief strand is the iliotibial. This is better adapted to taking the place of the quadriceps than the flexors. In the operation he separates it from the fascia lata, cutting it off from the femoral condyle. The part separated is about 1 1/2 cm. broad and from 10 to 12 cm. in length. It is then fastened to the patellar tendon with heavy silk strands which are continued down over the patella to be eventually affixed into the tuberosity of the tibia. In the cases which he operated on, he seems to have achieved excellent results, several cases which required braces before treatment being able to get along without them after treatment. There were no mishaps or bad results. There are two dangers which must be looked out for—one, that the tension of the transplanted band may become lost, and the other, the recurrence of flexion contracture of the knee. This report is of suggestive interest and should be read by every man who does tendon transplantations.—*Henry O. Feiss, Cleveland, O.*

**Nerve or Tendon Plastic.** By Purckhauer. *Zeit. für orth. Chir.*, Band XXI, Heft 1–3, 1908.

Writer reports a case of wrist-drop in which Prof. Lange shortened the dorsal tendons and in which the result was so good that he uses the case as an example showing that the tendon operation is sufficient without nerve suture. Various operators would in such cases do both tendon and nerve suture. They would lay the chief weight on the nerve suture and less weight on the tendon reefing and the redressement. According to muscle-physiologic laws, however, nerve plastic is dispensable, and brings with it an unnecessary complication which if it goes wrong may impair such nerve function as is already present, thus interferring with the whole result of the operation. If it succeeds, it cannot be pointed to as a justification for nerve plastic because the result may be laid just as well to the tendon reefing and the redressement.—*Henry O. Feiss, Cleveland, O.*

**Disease of the Primary Motor Neurons Causing the Clinical Picture of Acute Anterior Poliomyelitis: The Result of Poisoning by Cyanid of Potassium.** By J. Collins and H. S. Martland. *Journal of Nervous and Mental Disease*, July, 1908.

Report of a case of acute inflammation or degeneration of the primary motor neurons following a long period of exposure to a solution of cyanide of potassium in a man who worked as a silver polisher. The attack began with a diarrhea followed by meningeal symptoms which lasted three or four days, followed by complete loss of power in the arms and legs in forty-eight hours. This was all within eight days after onset. This was followed by a marked atrophy of all muscles involved, but there was no loss of tactile thermal or pain sensations. There was no sign of recovery for six months, but patient can walk now, one and a half years after onset, with braces, and is still improving. The authors report the case on account of its rarity and interest and have also done some interesting work on rabbits, injecting them with cyanide of potassium solution and observing the destructive effects on the spinal cord which showed characteristic destruction of the cells in the anterior horns as occurring in anterior poliomyelitis and also observing the relation to the distribution of the resulting paralysis. The case is of interest as showing how we must be on the the lookout for diseases and conditions, arising from occupations and not resulting from the usual infective causes.—*J. W. Sever.*

**The Technic of Tendon Transplantation.** By Alessandro Codivilla. Reviewed in *Arch. f. Orthop., Mech. u. Unfallchir.*, Bd. VII, H. 1, p. 80.

The author insists that an exact plan of operation be determined on in advance and in determining the amount of damage to be repaired and the value of the sound muscles useful for this purpose, he lays all weight upon inspection, palpation and the determination of function and, *none* upon the electrical reactions.

Where severe deformity is present, this is first corrected by a "modeling redressement." At a later sitting the tendon plasty is performed. Here Codivilla strongly combats the schemes of operation as laid down by Lange and pleads for strict individualization. He rarely uses the artificial silk tendons.—*Walter G. Stern, Cleveland.*

## III. INFECTIOUS ARTHRITIS.

Joint Affections Caused by Infectious Diseases. W. K. Newton. Abstracted in Journal A. M. A., Sept. 5, 1908, p. 668.

Scarlatinal Joint Affections. G. E. Wladimiroff. Abstracted in Journal A. M. A., Sept. 5, 1908, p. 874.

Peculiarities of the S mptomatology of Rheumatism in Children. C. H. Dunn. Abstracted in Journal A. M. A., August 22, 1908, p. 709.

Full Directions for Technic of Serum Test for Syphilis. K. Taege. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1117.

Serum Diagnosis of Syphilis. Henry A. Christian. Progress in the Theory and Practice of Medicine, reported in Boston Med. and Surg. Jour., Sept. 3, 1908, p. 307.

The Question of Rheumatism Originating Through Tonsillar Infection. G. B. Hope. Am. Laryngological Association, May 11–13, 1908; Reported in Boston Med. and Surg. Journal, October 22, 1908, p. 550.

Case of Juvenile Paralysis from Inherited Syphilis. Senkpiel. Fortschritte der Medizin, Sept. 20, 1908, No. 26.

Gonorrheal Rheumatism. E. M. Buckingham. Clinical Meeting of Staff of Boston City Hospital; Reported in Boston Med. and Surg. Jour., Nov. 19, 1908, p. 681.

Ankylosis of the Jaws. F. Kirstein. Reported in Journal A. M. A., August 22, 1908, p. 716.

Hydatid Disease in Long Bones. A. Reich. Abstracted in Journal A. M. A., September 26, 1908, p. 1115.

Tonsils Excised for the Relief of Chronic Joint Infection. J. E. Goldthwait and H. P. Mosher. Clinical Meeting of Throat Department, Mass. General Hospital; Reported in Boston Med. and Surg. Jour., Aug. 27, 1908, p. 275.

Our Present Understanding of the Nontuberculous (Rheumatoid) Diseases of the Joints. J. E. Goldthwait. Abstracted in Journal A. M. A., October 31, 1908, p. 1551.

**Gonorrheal Arthritis.** By Preiser, Hamburg. *Hamburger Aerzte Korrespondenz*, 1908, No. 20, p. 191. Abstracted in *Zentralblatt fuer chir. und mech. Orth.*, October, 1908, by Ewald.

Agreeing with Koenig and Bennecke, Preiser divides the gonorrheal arthritis into four types: 1. Hydrops; 2. Serofibrinous inflammation; 3. Empyema; 4. Phlegmona. He has treated thirty-three cases of the last form, the most serious and most frequent one, which needs early orthopedic treatment. In comparison with acute articular rheumatism, the fever is neither high nor persistent for a long time. The reviewer cannot consent to the assertion of Preiser that only one joint is affected; we certainly see many cases in which more than one joint, sometimes a great many, are affected. Salicylate drugs are without any effect.

Preiser demonstrates the changes in the joints shown by X-ray pictures.

It seems that atrophy of the bones takes place when cartilage becomes destroyed. There are shown X-ray pictures of joints subluxated by an unstable position or ankylosed, especially of the wrist. Among the patients there were twenty-two women and eleven men. It appeared that the disease in the cases of the women had begun even in the first week after the genital infection.

*Treatment.*—Hot-water baths, early massage and exercises. Ice is useless. Removable plaster-of-Paris casts to secure the normal position of the joints. Bier's congestion was without success. This last fact seems striking, because Bier and many others have reported the excellent effect of congestion in gonorrheal arthritis. The reviewer has also had occasion in many cases to observe this effect.

In the discussion Lenhartz emphasizes the importance of early motions to avoid stiffness. In cases of gonorrheal arthritis of the wrist he has treated the swelling with good success by deep incisions. Plate considers retardation of the resorption produced by enlargement of the lymphatic glands as the cause of this swelling of the back of the hand. Therefore he tries to remove the swelling of the lymphatic glands by saline baths, inunction with soft soap and gentle massage. Koenig (Altona) has excised the joint in several cases on account of pain, or has made incisions and congestion afterward in order to wash out the toxic fluid. Kuemmel makes the puncture of the joint in cases of hydrarthros when the usual treatment is not sufficient. In dry forms he keeps the joint quiet. He does not advise early excision, because he has seen a remarkable spontaneous improvement after almost complete stiffness.—*H. Bucholz, Boston.*

**Arthrodesis of the Patella.** By C. Huebscher, Basel. *Zentralblatt fuer chir. und mech. Orthopedie,* July, 1908.

The arthrodesis of the knee joint involves the danger of angular ankylosis, so that wearing a brace is necessary until the twentieth year. Huebscher had made the arthrodesis of the patella in two cases of loosened knee in poliomyelitis and claims advantage for this operation on account of the following fact, that the motions of the knees, which were before absolutely useless, now have become sufficiently limited without confining the legs in stiff splints. He considers this partial but safely limited mobility of the knee-joint as extremely valuable for walking. The reviewer agrees with Huebscher in recommending this small operation, especially because if the results are bad it is always easy to perform the complete arthrodesis of the joint or other ankylosing operations

After cutting away the cartilage of the patella and femur Huebscher fixes the patella to the femur by a screw.—*H. Bucholz, Boston.*

**Suppurative Tenosynovitis of Flexors of Hand and Wrist, Bier's Hyperemia; Multiple Incisions.** By C. H. Peck, M. D., New York. *Annals of Surgery,* October, 1908.

An acute case, as per title, incised and packed for three days, then packing removed and passive hyperemia applied. In nine days suppuration had about ceased, there was no tendon sloughing, and motion in fingers and wrist returned rapidly.—*R. R. Fitch, Rochester, N. Y.*

**Arthroplasty for Ankylosis.** By J. H. Whitacre, M. D., Cincinnati, Ohio. *Lancet-Clinic,* April 18, 1908.

Dr. Whitacre presents the subject of arthroplasty in an interesting monograph, citing his own experience in two cases clearly reported. He refers to the types of ankylosis, viz.: (a) those due to capsular thickening; (b) those due to adhesion between synovial layers; (c) those due to destruction

of cartilage and bony union. He gives Murphy's unnecessarily complicated classification of arthritis, but does not state whether he finds it of practical value. He then refers to J. B. Murphy's studies in arthroplastic work published in the *Journal of the American Medical Association*, 1905, Vol. XLIV, pp. 1573–1671 and 1749. The essential feature of Murphy's procedure is the production of an hygroma between the bones. This develops in the flap of fat and fascia which he swings into the articulation. This develops just as a bursa forms under the influence of pressure or repeated trauma. He then enumerates the cautions that must be observed if the procedure is to be a success. The greatest stress is laid upon the complete removal of all those structures which originally gave stability to the joint, so that there are no connecting bands or ligaments to hold the bones together, and he quotes Murphy as saying that the result of the operation will be most favorable in the following joints and in this order, viz.: the mandibulæ, hip, shoulder, elbow and knee.

Two cases are then reported, both of ankylosis of the knee, after presumable gonorrheal infection in one case and some other infection in the other. In the first case thirteen months after the operation there was no lateral motion or hyperextension; active and passive flexion could be carried to 90° painlessly. The patient walks freely without pain and uses no cane or crutch.

The second case was operated upon in the same way over two years after the onset of an arthritis, and the immediate result was very satisfactory. One year later, however, there was abnormal mobility laterally and the stability of the joint was not satisfactory. A brace is to be worn and a later report is to be made.

These and Murphy's cases undoubtedly demonstrate the possibility of establishing a false joint after an arthroplasty. The surgical technic is very pretty, but it still remains to be seen whether an ankylosis in good position in the knee-joint is not a better result in a majority of cases than is the result after arthroplasty. It has been the personal experience of the abstractor that it is much more satisfactory to secure an ankylosis. The results in the hands of others so far as observed have not been encouraging in the knee-joint. In the hip, the shoulder and the elbow conditions are different.—*Charles F. Painter*

**Treatment of Septic Diseases with Enemata of Collargol.**—By Curt Seidel. *Deutsche med. Wochenschr.*, 1908, No. 31.

S. shows the difficulties of inunctions and intravenous injections of collargol. Enemata, if given in large doses, works quickly and is comfortable and simple. Eight cases, three being arthritis, are reported. Reaction follows in one to two hours. This consists of increased pain, chill or sensation of heat. Improvement in general condition, increase of appetite, improved sleep, lowering of temperature and pulse and localization of pain is noted early. Diminution of leukocytosis also noted. This treatment, if it is not employed too late and continued for a sufficient length of time, never, even in severe cases, fails. The dose must be large. It must not, however, be considered as a panacea.

*Method*:

1. A soap-and-warm-water enema daily.

2. Fifteen minutes after evacuation of the enema and accompanying stool, a careful irrigation with saline or soda to remove mucus. (Presence of mucus prevents absorption of drug.)

3. Fifteen minutes later 2 to 5 g. collargol in 50 to 100 g. warm boiled water. One to two times daily in severe cases.

4. In mild or chronic cases 1 to 2 g. in 50 to 100 g. warm boiled water, several times daily.

5. After improvement begins, dose is to recede, but continue for not less than fourteen days.

6. In change for worse, renew enemata, unless this is caused by abscess formation or other local affection.

The solutions are to be at room temperature. If the collargol is not retained add eight to twelve minims of Tr. opii simpl.; or, instead of twice daily, give four to six smaller enemata daily. Tenesmus or burning never follows. As an irrigation saline is better than soda, as the latter causes tenesmus of rectum. The silver is absorbed within the first hour after injection. This can be demonstrated by radiograph. If mucus is left, silver is seen six to eight hours later, the silver having been precipitated by the mucus.—*Alexander E. Horwitz.*

**Harrington's Solution in Treatment of Suppurative Inflammations of the Knee-joint.**—By J. E. Summers. *Surg., Gyn. and Obstetrics*, April, 1908.

Dr. Summers reports one case of acute septic knee which he treated by free incision and drainage and thorough washing-out of the joint at time of operation with Harrington's solution. The wound healed with practically no infection after this treatment. He suggests the use of this solution in all similar cases as an antiseptic wash.—*A. H. Crosbie.*

**Infections of the Knee-joint and Treatment.**—By W. C. G. Kirchner. *St. Louis Med. Review*, October, 1908.

Interesting paper from standpoint of treatment. The author points out the importance of the size, shape and location of the bursæ about the knee-joint, also the importance of popliteal fascia. He describes the use of Hodgen splint and constant irrigation for the relief of severe infections after the joint and the bursæ have been thoroughly opened and exposed to drainage.

**Arthritis Deformans in Children.** By I. A. Abt. *Interstate Medical Journal*, St. Louis, July, 1908.

The author believes that there are two forms: one with general enlargement of glands and spleen, symmetrical involvements of joints, no tendency to suppuration or ankylosis, usually muscular atrophy and contracture. This affects the poorer classes who live in unfavorable hygienic conditions. Definite cause unknown. Second form often follows exposure to cold or wet, progressive involvement of joints, ankylosis, pain, synovial membrane and cartilages disappear, bony thickening about joints, lipping, and bony grating appear. Seen where poverty or lack of sanitary conditions do not exist. Cause here seems to be an infection. The author reports a case of second variety.

**General Observation on Acute and Chronic Rheumatism.** By R. W. Webster. *Medical Fortnightly*, St. Louis, July 25, 1908.

The etiology of acute rheumatism is not positively established, certain predisposing factors exist such as hereditary or constitutional peculiarities, exhaustion, exposure to cold and dampness, depression of body functions, etc. The influence of these factors is little understood. Recent observations incline the author to believe that there is a definite bacterial agent, the diplococcus of Poynton and Paine or perhaps the anaerobic bacillus of Achalme. The author calls attention to the frequency of tonsil involvement in the early stages and to the heart involvement and swelling of the

thyroid. He states that nothing has been found at all characteristic in the urinary output.

The muscular forms of acute rheumatism differs from the articular forms in that they are not supposed to be of an infectious nature. The author goes over chronic rheumatism from a physiological standpoint. He says it is not due, as held by Haig, to uric acid which can only be regarded as a contributory factor. The constant over-loading of the system with proteid materials leads to a toxemia which produces muscular and articular changes. The author limits himself to a consideration of this metabolic type as so little is known about other forms of the chronic condition.—*Allison, St. Louis, Mo.*

**Report on the Natural and Artificial Substitution for the Extensor Cruris.** By Kofmann. *Zeit für orth. Chir.*, Band XXI, Heft 1–3, 1908.

Author runs over the anatomy of the muscles used in the movement of the knee joint and has adopted the following rule for transplantation. If the muscles present when distributed about the joint are sufficient to assure the correct stability both in flexion and extension, then muscle plastic is to be done, if not, then we must do an obliteration of the joint. He states that the very best method, when possible, is to use the tensor fascia lata. If this is absent the sartorius is useful. If these are insufficient, one of the flexors can be added and finally, where both the sartorius and tensor are absent both flexors are to be brought round.—*Henry O. Feiss, Cleveland, O.*

**The Treatment of Contractures and Anchylosis.** By Jerusalem. *Zeit für Orth. Chir.*, Band XXI, Heft 1–3, 1908.

1. Experience with the great Bier-Klapp apparatus. This apparatus consists of a Bier suction chamber in which the contracted joints are moved. Author describes the result in certain cases and gives a brief account of the mechanism of the apparatus. The chief advantages are: First, the painlessness of the application, due, above all, to the hyperemia. Second, the possibility of fine dosage and adjustment of the applied force (air pressure). The apparatus is very advantageous in the treatment of contractures after severe injuries to the soft parts, and in phlegmons or operative scars on the extremities. With the help of the suction therapy the after-treatment of fractures and dislocations can be much shortened.

2. The arthrometer, a new and simple measuring apparatus to determine the joint excursion in the treatment of contractures and anchylosis. It is undoubtedly of importance to establish the pathological position of the diseased joint as well as the excursion angle. It is only by such means that the therapeutic effect is controllable. The apparatus of the past was either too inaccurate or too clumsy. For this reason the author has attempted to construct simple instruments which would overcome the defects of the others. Description of apparatus.—*Henry O. Feiss, Cleveland, O.*

## IV. INFECTIOUS BONE DISEASE, INCLUDING SYPHILIS.

A Case of Very Prolonged Suppuration of the Femur Following Typhoid. R. Fogh. Deutsche med. Woch., July 23, 1908, No. 30.

**Acute Osteomyelitis of the Right Os Pubis and Central Pathological Dislocation of the Femur.** By P. Esau, Greifswald. *Deutsche Zeitschrift fuer Chirurgie*, Band XCI, p. 611. Abstracted in *Zentralblatt fuer chir. und mech. Orthop.*, July, 1908, by Stoffel.

Report of a ten-year-old child who had fallen acutely sick ten days before A large swelling was found occupying the right thigh, groin and lower ab-

dominal region. The right leg was extremely flexed and abducted and was not moved actively. The right thigh seemed shortened. Rectal examination showed on the right side a smooth, half spherical body moving with the thigh. A very large abscess was opened and emptied behind the symphysis. The child died in a few days. The examination of the pelvis itself showed the ischium almost completely separated from the os pubis and the acetabulum. The ischium was rough and grayish-colored. There was a broad slit in place of the Y-fissure of the acetabulum. The cartilage of the acetabulum, the capsule, the ligamentum teres and the other ligaments of the hip-joint were destroyed. The head of the femur was grayish-colored; its neck protruded $2\frac{1}{2}$ cm. into the pelvis. The os pubis had no periosteum and was discolored. The symphyseal cartilage was loosened. From the anatomical findings it must be supposed that the osteomyelitis was produced by streptococcus and had its origin in the os pubis.—*H. Bucholz, Boston.*

**Arthropathia Tabica.** By Wendel, Magdeburg. *Muenchener med. Wochenschrift*, 1908, p. 1312.

In the Medizinische Gesellschaft at Magdeburg Wendel has shown a man with a neuropathic arthritis of the foot-joint, which was anatomically and radiographically just like a tabetic arthropathy. It began three years before with pain and swelling. Then a fibrinous abscess was evacuated by an incision which has not yet closed. The clinical examination and X-ray pictures show a complete destruction of the foot-joint and alterations of the ends of the tibia and fibula characteristic of the Charcot's joint, although there were not any signs of a nervous affection like tabes or syringomyelia. The foot was amputated after the osteoplastic method of Bier modified by Eiselberg. The patient began with weight-bearing exercises on the tenth day, and on the nineteenth day, the day of the demonstration, he was able to walk on his artificial leg without much trouble, even over stairs.—*H. Bucholz, Boston.*

**Gonorrheal Exostoses of the Os Calcis; Report of a Case Complicated by Metatarsalgia.** By A. J. Davidson. *Medical Record*, October 3, 1908.

Brief review of the literature of the subject and report of such a case. In addition to the involvement of the os calcis on both sides, the distal end of the fourth left metatarsal bone was affected. Removal of the exostoses and of the head of the fourth metatarsal bone gave a satisfactory result. Cultures in blood serum were sterile.—*David Silver, Pittsburgh.*

**Nontuberculous Osteomyelitis of the Os Calcis.** By John G. Sheldon, M. D., Kansas City, Mo. *Annals of Surgery*, November, 1908.

Report of three such cases following injury to the foot. Recovery in each case after operation. Photograph and X-ray of one case. Historical sketch of similar cases in literature.—*R. R. Fitch, M. D., Rochester, N. Y.*

**Bone-filling.**

Dr. James T. Watkins in a paper published in the *California State Journal*, January, 1908, reports what he believes to be the first case of bone filling by means of the iodoform bone plug of von Mosetig Moorhof in this section of the country.

He stated that no marked results have been reached either by the exponents of the autoplastic or the heteroplastic methods.

He wishes to call attention to a new member of the heteroplastic group.

He describes in detail the characteristics of the mass, and also shows von Mosetig Moorhof's technic in the preparation of his filling.

Next the preparation of the bone cavity is done in the usual way; and the fillings introduced with such care as he describes.

In the case which he reports, the patient was referred to him in January, 1903. There were found several discharging sinuses of the right tibia following an acute osteomyelitis. An operation was performed, curettage, pure carbolic acid being used. Patient left hospital in April. In June, 1905, two years later he returned with large depressed scar at site of old operation, accompanied by a discharging sinus. Another operation was performed, this time the cavity being filled with Moorhof's mass. Patient returned home September 28.

He states that reports which he has recieved from the attending physician and the child's mother, show that the depression remains, but seems to be filling slowly.

He is inclined to believe that even this partial result must be considered better than the older methods, and he is inclined to blame poor technic for the failures rather than the method itself, especially as von Mosetig Moorhof has performed this operation more than one hundred times.—*S. F. Hunkin, San Francisco.*

**Hereditary Syphilis of the Long Bones.** By Menard, Le Moine and Pénard. *Gaz. des Hôp.*, 1908, Nos. 48 and 51.

The observations on which this paper are based are from twenty cases sent with the diagnosis of tuberculosis, to the Maritime Hospital at Berck. The article is of the nature of a general review, is well illustrated with reproductions from radiographs, and brief histories of all the cases are included, grouped to illustrate the various points emphasized. The lesion is not uncommon; only when other stigmata are absent is diagnosis difficult. Manifested as a rule during infancy, development of lesions sometimes occurs in the second decade. Of a total of fifty-three foci the tibia was involved in twenty-four cases, ulna in ten, femur in six, humerus in five, radius in four, fibula in four. In contrast with tuberculosis the characteristic lesion is an hyperostosis, limited at first to one segment, but apt to involve later the greater part or the whole of the bone. It may occur first either in the diaphysis or the epiphysis; generally both are involved together. The intervening cartilage forms no obstacle to the extension of the condition. In absence of external deformity the bony changes are discovered only by systematic palpation. The thickening is always diffuse. Curves in the axes of the bones are probably due to rickets, not syphilis. Not only a thickening, but often a lengthening of the bone occurs; a flat-foot or a club-hand results when but one of the parallel bones is lengthened. Subjective symptoms are slight. The earliest and thus a most important sign is localized pain on pressure, often occurring before tumefaction is apparent.

*Evolution.*—After the initial activity the osteitis may be latent for years even, then, with no apparent cause, old lesions will increase and new ones appear. Or hyperostoses may disappear spontaneously or under treatment. Cystic changes occur from breaking-down of gummata, resulting, in spite of treatment sometimes, in superficial ulcers. The exposed bone exfoliates, and the condition, while not tending to extend, obstinately resists treatment. The same thing is seen after surgical interventions.

*Complications.*—Hydrarthrosis is produced in some cases by the close proximity of the osteitis to a joint. Epiphyseal lesions may perforate the

joint and cause a secondary arthritis. These may closely resemble tuberculous conditions, especially if they have gone on to ankylosis.

*Diagnosis.*—In ulcerating cases with bone necrosis tuberculosis must be considered. The long bones should be carefully examined, if need be by radioscopy, for slight changes elsewhere. Even in absence of other stigmata, and of a reliable family history, multiplicity of lesions points to syphilis.

*Treatment.*—Specific treatment is the only means of checking the evolution of the gummatous forms and inducing resorption. Advanced hyperostoses with eburnated bone, as a rule, are not to be entirely reduced. Surgical intervention i to be avoided; in those cases in which it was practiced it was throug an error in diagnosis and the results were disastrous, being followed by necrosis with sequestration of bone, and rendering unavoidable successive operations, delaying healing for months or even years.—*Roades Fayerweather, Baltimore.*

**Serum Diagnosis of Syphilis.** By W. J. Butler. *Journal A. M. A., Septemper*, 5, 1908.

A paper dealing with an elaborate review of the literature and experimental work which has been done, and also a list of the experimenters and their statistics.

He also describes the technic for the determination of the serum diagnosis and the preparation of the extracts, sera, complement and washed blood-corpuscles used in preparing the substances employed in the reaction.

He describes a number of cases on which he used the serum diagnosis and noted also the influence of a 1–10,000 solution of mercuric chloride on the various substances used in the reaction. He found that the mercuric-chloride solution had no effect on these. He concludes from his and other experiments that the serum reaction is specific, is found positive in 90 to 95 per cent. of all cases of syphilitic manifestations is positive in 50 to 60 per cent. of latent cases and is positive in from 70 to 80 per cent. of parasyphilitic diseases. The reaction is influenced in many cases by the treatment of the patient; that a positive reaction indicates activity of the specific virus and is an indication for antisyphilitic treatment.

It is an interesting article and well worth studying if one is going to attempt to use the serum for diagnostic purposes.—*J. W. Sever.*

## V. METABOLIC DISTURBANCES CAUSING BONE AND JOINT DISEASE.

Operative Treatment of Coxa Vara. Royal Whitman. Meeting of N. Y. Surgical Society, April 8, 1908. Reported in Annals of Surgery, Sept., 1908, p. 446.

Purin Metabolism in Gout. H. C. Bradley. Abstracted in Journal A. M. A., Sept. 5, 1908, p. 868.

Chronic Progressive, Deforming Rheumatism from Thyroid Insufficiency. E. Sergent and P. Ménard. Abstracted in Journal A. M. A., August 22, 1908, p. 713.

Endemic Deforming Osteoarthritis in Eastern Siberia. E. Beck. Abstracted in Journal A. M. A., August 22, 1908, p. 714.

Treatment of Gout. L. A. Amblard. Abstracted in Journal A. M. A., September 12, 1908, p. 953.

Dietetic and Physical Treatment of Gout. M. Hirsch. Abstracted in Journal A. M. A., Sept. 12, 1908, p. 955.

Rachitic Changes in the Skeleton in Ancient Times and in the Middle Ages. Ebstein. Abstracted in Journal A. M. A., October 24, 1908, p. 1474.

Influence of the Suprarenal Glands on the Bony Skeleton in Relation to Osteomalacia and Rickets. L. M. Bossi. Abstracted in Journal A. M. A., October 17, 1908, p. 1378.

A Frequent Apparently Hitherto Undescribed Affection of Certain Bones in Children. A. Köhler. Abstracted in Journal A. M. A., October 24, 1908, p. 1474.

Early Rachitis. E. Wieland. Abstracted in Boston Med. and Surg. Journal, Oct. 15, 1908, p. 518.

Chemical and Histological Study of Blood in Acromegaly. G. Franchini. Abstracted in Journal A. M. A., October 10, 1908, p. 1288.

Gout: A Disease of the Metabolism; Its Treatment. O. T. Osborne. Monthly Cyclopedia and Med. Bulletin, August, 1908, p. 397.

Paget's Deforming Osteitis. K. Glaessner. Abstracted in Journal A. M. A., October 24, 1908, p. 1474.

Case of Osteitis Deformans (Paget). H. Herbert. Southern California Practitioner, October, 1908.

**Nontuberculous Bone Infections About the Hip-joint. A Clinical and Roentgenological Study.** By A. T. Legg and A. W. George. *Boston Med. and Surg. Jour.*, Sept. 17, 1908.

A brief discussion of pyogenic bone infections resulting in acute or chronic osteomyelitis. Early recognition and appropriate treatment of great importance in securing good results. Such cases, especially when of the subacute or chronic form, are frequently treated under the impression that they are tuberculous. If the periosteum be involved, the Roentgenogram will show thickening or proliferation or a ragged periosteal outline. If the infection be in the marrow, areas of increased radiability are found. In chronic cases there are definite areas of bone destruction, usually with periosteal proliferation. Sequestrum and involucrum formation may occur.

In tuberculosis, the bone itself becomes atrophied at an early stage, and an area of increased radiability, gradually increasing in size, can be detected. The tubercle bacillus does not cause periosteal reaction, and consequently any such manifestation is indicative of a mixed or pyogenic infection.

Ten cases are reported, and are illustrated with remarkably good Roentgenograms. The article suffers severely from careless proof-reading.—*E. W. Ryerson, Chicago.*

**Myositis Ossificans Progressiva.** By W. Walker. *International Clinics.* Vol. III. Series 18.

Description of a case in a seven-year-old female, with radiograms and photographs and a brief review of the subject. References.—*David Silver, Pittsburgh.*

**Infantile Arthritis Deformans of the Hip.** By Gioachino Negroni. Reviewed in *Arch. f. Orthop., Mech. u Unfallchir.*, Bd. VII, H. 1, p. 89.

Report of three cases, two of which were improved by osteotomy of the neck. This disease is much more prevalent than the literature on the subject would indicate.

Negroni believes the pathological changes to be the same here as in malum coxæ senilis, where the capsule proliferates and hardens and the cartilage degenerates and becomes absorbed and on account of motion and pressure the head becomes flattened and deformed.—*Walter G. Stern, Cleveland, O.*

**Chondrodystrophia Fœtalis.** By P. W. Nathan. *Am. Jour. of Med. Sciences*, April, 1908.

Intrauerine, mortality very high. Often known as congenital rachitis. Head is abnormally large, extremities short, bent and deformed. Pathological examinations show that the changes in the bones occur primarily in the cartilage. There is more or less complete inhibition of the normal row

formation of the proliferating cartilage cells in the preparatory stage of ossification. There is shortening not only of the long bones, but also of the bone of the skull which gives the infant the look of a crete. There is defective growth of the enchondral skeleton, including the base of the skull and the pelvis. Most are born dead. The type is a dwarf, large, short head; very short and often bowed extremities. The epiphyses are prominent. The hair is abundant, fine and soft. During early life they are obese. The mental faculties seem to be normal. Nothing is known of the etiology.—*A. H. Crosbie.*

**Hypertrophic Arthritis of Spine.** H. W. Smith. *U. S. Naval Med. Bull.*, Jan., 1908.

Dr. Smith speaks of the obscure etiology, mentioning exposure and gonorrhea as possible factors.

The pathology is a nodular enlargement of the edges of the articular cartilages, which subsequently ossifies. Fusion and ankylosis follow. In the spine the process begins anteriorly and extends up and down the anterior lateral ligament. Symptoms are pain, limitation of motion, muscular contractions and referred pain. In making the diagnosis it must be differentiated from atrophic arthritis in which there is definite loss of substance between the bones with subsequent fusion. The treatment is fixation, good hygiene, plenty of water.—*A. H. Crosbie.*

**Rheumatoid Arthritis, Osteoarthritis, Arthritis Deformans.** *Boston Medical and Surgical Journal*, Feb. 20, 1908.

Dr. Bradford calls attention to the preliminary work of Andrews and Hoke on the albuminous putrefaction of the intestines in arthritis deformans. They recommend the use of fermented milk. The indican of the urine and the alkalinity of the feces disappear under diet of fermented milk.—*A. H Crosbie.*

**On Distorsio Genu (Sprained Knee).** By Staffel. *Zeit. für orth. Chir.*, Band XXI, Heft 1–3, 1908.

The writer does not see sprained knees in their earliest stages. They are sent to him several weeks or months after the original injury. In this stage they manifest disability, such as pain in the whole knee or localized to the part injured, incapacity, etc. The knee is often unable to carry much weight in walking. An important sign is the fact that the normal roundness of the thigh is flattened. As a definite prognosis in each case, he states that the sprain will be completely healed only when the knee on that side can raise as much weight as the knee on the other side. He uses one of the Zander instruments to test this function. From four weeks to three months are required to bring about a good result, using thermal baths, faradization of the quadriceps, manual massage of the knee and the quadriceps and medico-mechanical practice.—*Henry O. Feiss, Cleveland, O.*

**Observations upon the Colored Children of Jamaica, with Especial Reference to Rickets and to Mongolian Spots.** By Albert E. Vipond. *Archives of Pediatrics*, July, 1908, page 503.

An interesting sketch of Jamaican children, who, although fed from earliest childhood on apparently the most starchy foods, such as rice, bread, potato, yam, banana, corn starch, etc., were practically free from rickets, only about 2 per cent. developed this disease in acute form. They also

slept and lived in quarters poorly aired and ventilated. These conditions, he thinks, tend to upset our notions in regard to starch and poor hygiene as causative factors in the production of rickets. He did not see one aggravated case of rickets. He also discusses the occurrence of malaria, enlarged tonsils and adenoids and skin lesions.—*J. W. Sever, Boston.*

**Arthritis Deformans and the So-called Chronic Rheumatisms. A Roentgenological and Anatomical Study.** By Hoffa and Wollenberg. Reviewed in *Arch. f. Orthop., Mech. u. unfallchir.*, Bd. VII, H. 1, p. 102.

The work is divided into five chapters:

1. Arthritis Deformans.
2. Primary Chronic Progressive Polyarthritis.
3. Secondary Chronic Rheumatism.
4. Anatomy of subjects 2 and 3.
5. Differential Diagnosis.

As the title indicates the greater part of the work is devoted to a Roentgenological, anatomical and histological exposition of the subject. The etiology, symptomatology, prognosis and treatment are only briefly mentioned and a few clinical histories are cited as illustrations of the methods involved in the various examinations.

Arthritis deformans and chronic progressive polyarthritis are distinct processes with dissimilar etiology, course, duration and outcome. The reason why the two diseases are still confused is that most cases of chronic progressive polyarthritis which come under observation are in the last stages of the disease with the joint changes so pronounced and complete in its destruction that they are with difficulty pronounced one or the other.

It is greatly to the credit of the authors that they are the first to have brought out an exact anatomical differentiation of the two diseases in their earliest stages. The point they insist upon is that chronic progressive polyarthritis never begins with bone proliferation or ever has any bone hyperplasia or joint deformation until in its last stages, when it may be complicated with a secondary arthritis deformans.—*Walter G. Stern, Cleveland.*

**A Contribution to the Pathology of Rhizomelic Spondylosis.** By Beduschi and Jardini. Reviewed in *Arch. f. Orth., Mech. u. Unfallchir.*, Bd. VII, H. 1, p. 87.

Report of an autopsy performed upon a fifty-seven-year-old woman who had long-been under clinical observation. The ant. longitudinal ligament and the intervertebral disks were normal, but the lig. flava, the interspinal ligaments, the capsule of the posterior vertebral and costal articulations were thickened and infiltrated. The cord showed hemorrhagic areas with the formation of cavities. Both hips showed changes from a widespread chronic arthritis.

They draw the following general conclusions:

Rhizomelic spondylosis is a chronic inflammatory process of the spinal articulations with secondary involvement of the spinal cord. These latter changes are symmetrical areas of hemorrhage and vacuolization. The other joints of the body may also be involved in the general ankylotic process; although unless the arthritis is a most severe one muscle contractures and a subsequent muscular ankylosis is the more usual type encountered.—*Walter G. Stern, Cleveland, O.*

## VI. BONE AND JOINT TUMORS, BENIGN AND MALIGNANT. EXOSTOSES, ETC.

Enchondroma in the Tendon Sheath of a Finger. R. R. Walker. Clinical Journal, London, July 22, 1908.

Congenital Sarcoma of the Femur Cured by Operative and Roentgen-ray Treatment, with Remarks on Congenital Malignant Tumors. C. Goebel. Abstracted in Journal A. M. A., October 10, 1908, p. 1287.

Extirpation of the Talus for Sarcoma. Borchardt. Deutsche med. Wochenschrift, No. 7, 1908, p. 307.

**Tumors of the Cauda Equinæ.** *Boston Med. Surg. Jour.* Report of Progress in *Orth. Surg.*, Feb. 20, 1908.

The most important symptoms of tumor of the cauda equinæ are: pain in the lower limbs, simulating sciatica, unilateral at first, bilateral later, flaccid paralysis with reaction of degeneration and later atrophy of muscles; anesthesia in the region of the perineum and external genitalia, rarely paralysis of the bladder and rectum. The sensory symptoms are usually the first to appear. The results of operation have been discouraging.—*A. H. Crosbie.*

## VII. SCOLIOSIS AND STATIC DISTURBANCES.

Rachitis and Scholiosis. E. Kirsch. Abstracted in Journal A. M. A., August 29, 1908, p. 798.

Physical Therapy in Treatment of Lateral Curvature. A. Holding. Abstracted in Journal A. M. A., Nov. 7, 1908, p. 1641.

Report on a Form of Occupation Scoliosis. Wilhelm Schulthess. Ztschr. f. orth. Chir., Bd. XXII, H. 1–3, p. 90, 1908.

Diagnosis of Painful Feet. E. L. Scott. Abstracted in Journal A. M. A., August 29, 1908, p. 791.

Disabled Foot in the Military Service and Its Diagnosis by the Use of the Skiagraph. G. H. Richardson. Military Surgeon, Carlisle, Penn., August, 1908.

Flatfoot. R. O. Meisenbach. Abstracted in Journal A. M. A., October 31, 1908, p. 1550.

**Treatment of the Contracted Flat-foot During Sleep.** By C. Hübscher. *Zentralbl. f. Chir.*, Oct. 17, 1908, No. 42.

Author claims from his experience that the reflex muscle spasm of the contracted flat-foot disappears, without exception, during natural sleep, to reappear again with equal certainty on the first movement or attempt to stand. He makes use of this fact by applying elastic traction (illustration) so as to exert a supinating force, and says that the foot will be found in the morning in the desired position of supination, and further that it can be actively supinated and pronated; feet, which on the next day are not found supinated, are not pure contracted feet, but are fixed by adhesions and require correction under anesthesia. He claims by this method to be able to avoid long continued immobilization in plaster.—*David Silver, Pittsburg.*

**Important Flat-foot Facts; For Assimilation and Dissemination.** By Edward A. Tracy, M. D. *Boston Medical Record*, Nov. 7, 1908.

A timely suggestion on the early recognition of weakened arches for the general practioner, with its possible cure when treated in a proper way in the early stages. In enumerating the etiological factors he loses sight of probably the most frequent cause of weakened feet, especially the involvement of the anterior arches, and that is improper shoes. This is a factor which writers frequently lose sight of and one which the profession at large rarely considers.

A form of apparatus which will hold the arch in position with the weight of the body applied, and yet will not cause a weakened condition of the muscles and ligaments during convalescence is much sought after, and it is unfortunate that a more definite description of the apparatus he employs is not given. He mentions, however, the use of springs inserted into leather.

The article calls attention to a number of interesting points, especially with reference to an early diagnosis, which, as the author says, is of great importance from a prognostic standpoint.—*John Dunlop, Washington, D. C.*

**The Paradox Position of the Pelvis in Scoliosis.** By Arthur Steindler, M. D. Chicago. *Surgery, Gynecology and Obstetrics.* September, 1908.

The author speaks of the ordinary relation of the pelvis to the spine in scoliosis, and then reports seven cases where this relation was disturbed, In all these cases there existed a static lowering of the right side of the pelvis caused by a short right leg.

The important points are the relation of the lumbar spine and the pelvic position, when the convexity of the curvature is on the side of the raised half of the pelvis.

The author feels that we must consider these cases as due to a secondary cause in patients where a static by different position of the pelvis due to inequality of the legs is present.

He considers this condition not so very rare, he found three positive cases among forty-three cases of scoliosis in 1906.—*Edward S. Hatch.*

**Anterior Metatarsalgia.**—By Lehr. *Zeit. für orth. Chir.*, Band XXI Heft 4, 1908.

Of the typical painful points in flat-foot, that under the middle of the anterior foot plays an important part. If we examine such cases closely we find the cause to be a flattening of the transverse arch. We have an anatomical change of position of individual bones and must give this disease picture its particular place. This is the more important because the usual therapy of flat-foot aims essentially to support the longitudinal arch with little reference to the transverse arch. If the disability is truly due to the sinking of the transverse arch, then it ought to be alleviated if the proper conditions are reestablished. As a matter of fact, this is possible. The method used is simply that of holding together the front of the foot by the application of an adhesive plaster. The plaster is wound around once or twice. The amount of tension will be determined by experience.—*Henry O. Feiss, Cleveland, O.*

**The Significance of the Capsule of the Hip-joint in the Mechanics of Coxa Vara** By Baeyer. *Zeit. für orth. Chir.* Band XXI, Heft 4, 1908.

In the picture of coxa vara we find a number of variations in the movements of the joint. These differ in different cases, but when they are all present we have the typical coxa vara. These variations in movability are: 1, limitation of abduction; 2, limitation of inward rotation, 3; increase in outward rotation; 4, hyperextension; 5, limitation in flexion; 6, flexion occurring only with synchronous inward rotation. The causes of these departures from the normal are due to changes in the bones and cartilages, in the capsule and in the movements. The theme of the present communication is the study of the influence of the capsule.

Author finds that the increased possibility of extension is due to the fact that those bands which usually limit extension are now made relatively long on account of the bend in the neck of the femur, thus bringing about approx-

imation of the insertion points. The limitation in bending is due to the arrangement of the superior iliofemoral ligaments. With regard to limitation in abduction, this is due to mechanical interference in the bones. Variations in the movability in inward and outward rotation are explained on a basis of modified tension of the capsule, the stronger posterior ischiofemoral ligament limiting inward rotation, whereas the relatively long pubocapsular ligaments permit increased inward rotation.—*Henry O. Feiss, Cleveland, O.*

**A Case of Spondylolisthesis.** By Brandenberg. *Zeit. für orth. Chir.*, Band XXI, Heft 1–3, 1908.

Case described of a man showing a marked dorsal lumbar kyphosis involving the first, second and third lumbar vertebræ, while the fourth and fifth are involved in a peculiar lordotic incurvation. The Roentgen picture shows that the angle between the sacrum and the last dorsal vertebra is altered to a marked degree as well as the position of the first and second sacral segments, there being a complete fusion between the last vertebræ. The author believes that this is a case which was first spondylolysis developing later, on account of weight-bearing, into spondylolisthesis.—*Henry O. Feiss, Cleveland, O.*

**Report on a Rare Cause of Genu Valgum and Pes Valgus.** By Ottendorf. *Zeit für orth. Chir.*, Band XXI, Heft 1–3, 1908.

Case of a child in which there occurs a genu valgum on the right knee and in which the left foot shows extreme deformity, forming a bayonet angle with the leg so marked that the mid-line of the lower leg passes through the inner edge of the foot. The Roentgen findings are quite remarkable. The proximal ends of both fibulæ show no epiphyseal line, the fibular heads are elongated and only a few islands of lime-containing tissue are present. The picture of the foot shows besides the altered shape and relationship the lower part of the fibula transformed into a coarse-meshed tissue containing little lime, the external cortex, having entirely disappeared. A similar process seems to be beginning on the other fibula. Plastic operations were done, but with only temporary improvement. Discussion of the etiology. These manifestations are characteristic of syphilis. The symmetrical occurrence, the localization of the lesion in the epiphysis and the near part of the diaphysis as well as the fact that the disease entered the center of the bone as well as the cortex, makes the diagnosis certain.—*Henry O. Feiss, Cleveland, O.*

**How Control the Result of Treatment in Scoliosis?** By Hartel. *Zeit. für orth. Chir.*, Band XXI, Heft 1–3, 1908.

Author's summary: Of the many methods of control which have been applied to scoliosis, we regard the following as simple, practical and advisable: First, the taking of an accurate history with monthly revision of the condition. Second, the employment of a monthly weight curve. Third, the taking of the heights with the patient both in a relaxed attitude and in his best attitude. Fourth, stereoscopic photographs at intervals of one-fourth to one-half a year. There must always be two exposures, one in a relaxed and one in the best attitude.—*Henry O. Feiss, Cleveland, O.*

**Some Thoughts Concerning Flat-foot and Flat-foot Supports.** By Franz Staffel. *Arch. f. Orthop., Mech. u. Unfallchir.*, Bd. VII, H. 1.

Staffel's support is made of cork and the instep of the shoe is prevented from sinking by bringing the heel foreward on the inside to the middle of the arch.

The object of such supports is either (1) to relieve the symptoms or (2) to prevent the flat-foot from getting worse or to correct where possible or both

Almost any kind of support will relieve the symptoms, especially of a mild case, and must therefore have its enthusiastic adherents; but it is also clearly true that no one support is suitable for all cases. To merely relieve symptoms no apparatus (according to Staffel) is necessary, merely a shoe made upon a normal last and which has some satisfactory mechanism to prevent the arch of the shoe from breaking down when wet. The large heel brought forward on the inside will not answer, as it makes the shoes too "plump heavy, and inelastic." The author recommends instead the use of a special elastic steel shank which should be strong enough to support the weight of the body. The shank properly shaped and tempered is fastened in the heel, is incorporated in the soles and runs along the inside of the instep and ends under the ball of the great toe. Staffel confesses that such a steel shank, even though nickle-plated or enameled, will soon rust and will have to be renewed very often and therefore must be made in large numbers at one time. If one does not care to incorporate such a steel shank into the soles of the shoe it can be transformed into a plate by covering it with leather and then worn inside of the shoe.

The correction or overcorrection of a mild case of flat-foot whether it produces symptoms or not, is another matter. This can be done by means of appropriate supports, provided the foot be mobile and the supports have what the author terms the "energetic form." Severe cases cannot be corrected by these means. In cases of weak or pronated feet an "energetic" insole together with exercises, massage, gymnastics, baths, electricity, etc., to strengthen the muscles may work a speedy strengthening of the arch. Staffel warns against fatigue or overexertion in the exercises.

After discussing what a Thomas heel may or may not be able to accomplish, Staffel gives the reasons why he prefers cork inserts to all other methods of making corrective flat-foot supports; the chief reason being its elasticity and the softness of the material.—*Walter G. Stern, Cleveland.*

**Flat-foot.** By Pietro Bossi. Abstracted in *Arch. f. Orthop., Mech. u. Unfallchir.*, Bd. VII, H. 1, p. 82.

The introduction to this monograph of over 200 pages is an excellent review of the special anatomy and physiology of the foot.

(The chapter on congenital deformities is not in accord with the best authorities on the subject, in fact quite incorrect if such a criticism can rightfully be given, inasmuch as the present abstractor is not reviewing the original monograph, but only the German review.) Bossi claims congenital "pes valgus" to be a rarity, while congenital flat-foot is a stigma of degeneration and is found most commonly among Jews, cannibals and negroes. The causes of congenital flat-foot he rightfully attributes to abnormal intrauterine pressure. He is entirely in error in denying any special anatomy to congenital flat-foot, which as Volkman and Küstner have shown has many points of peculiar interest. The two cases which he calls congenital flat-foot and which he ascribes to an excessive lengthening of the fibula are really confessed cases of congenital dislocation of the foot and do not belong to the subject under discussion. (The congenital part of this monograph makes a distinctly bad impression as to accuracy or fruitfulness.)

The greater part of the work is devoted to acquired flat-foot which he says is either traumatic, static or due to bone, joint or muscle disease. After reviewing all the theories of the etiology of flat-foot, Bossi comes to the conclusion that they are mostly speculative and do not solve the problem.

His own experiments were made upon a skeleton foot which was weighted and the changes in the configuration of the arch noted with each change of the weight. He concludes from them that "the foot is composed of a series of arches joined by means of ball (sic!) joints, and forming two systems." The rotation of the calcaneus is the crucial anatomical incident which leads to the lengthening of these two systems of arches and the typical pathological changes.

Bossi has tried several methods of treatment. In four cases (it is not related that they were exceptionally difficult or resistant to other treatment) be transplanted the inner half of the tendon of the tibali anticus, so that is should pull the foot "as an elastic band" in the right position. The results of this series of operations were only fair. Twice he performed the Ogston operation with good results.

But, he concludes, bloody operations will not solve the problem which is a similar one to that of scoliosis; the rational treatment is therefore forcible overcorrection and fixation in a plaster cast.—*Walter G. Stern, Cleveland.*

## VIII. CONGENITAL DEFECTS, INCLUDING CONGENITAL DISLOCATIONS.

Congenital Ankylosis of Fingers with Brachydactylia. M. Goerlich. Beiträge zur klin. Chir., August, 1908, LIX, No. 2.

Deformities of the Radius. M. Goerlich. Beiträge zur klin. Chir., August, 1908, LIX, No. 2.

An Account of a Brachydactylous Family. H. Drinkwater. Proceedings of Royal Society of Edinburgh, Session 1907–1908. Vol. XXVIII, Part 1.

Case of Hereditary Brachydactyly. P. W. Matthew. British Med. Journal, October 3, 1908.

Congenital Dislocation of the Hip Appearing in Combination with Other Congenital Anomalies. Georg Joachimsthal. Ztschr. f. orth. Chir., 1908, Bd. XXII, H. 1–3, p. 31.

Case of So-called Congenital Elevation of the Shoulder. B. Mautner and A. Selka. Abstracted in Zentralbl. f. chir. u. mech. Orth., August, 1908, p. 373.

Congenital Familial Dermatogenic Contracture of the Finger-joints. Henneberg. Deutsche med. Woch., October 15, 1908, XXXIV, No. 42.

**Coxa Valga as a Preliminary Stage of the Congenital Dislocation of the Hip.** By Preiser, Hamburg. *Aerztlicher Verein Hamburg*, March 10, 1908. Abstracted in *Zentralblatt fuer chir. und mech. Orth.*, July, 1908, by Ewald.

Report of a case of a ten-year-old boy who has learned to walk only within two years. The X-ray pictures show the change of the angle of the neck of the femur in accordance with the rotation of the leg. Preiser calls attention to the mistake easily made in interpreting these pictures. In his case the angle was 160°, and this in such a position that the trochanter minor was visible. In addition to the elevation of the angle an anteversion was present, and in this Preiser believes he sees the nature of coxa valga. Furthermore, he mentions that coxa valga is almost always present in congenital dislocation, and considers the former, whenever observed without dislocation—congenital only rarely—as a preliminary stage of the latter. Preiser tries to confirm this belief by the position of the acetabulum, to be appreciated by comparison of the distance of the cristæ and spinæ, and induced by mechanical causes, occurring in the uterus in the second and third fetal months.—*H. Bucholz, Boston.*

**Madelung's Deformity, with Especial Reference to a Reversed Form.** By De Witt Stetten. *Zentrabl. f. Chir.*, Aug. 1, 1908, No. 31.

Description of a case presenting all the peculiarities which are regarded at present as characteristic of Madelung's deformity, but in a reversed form; that is, the lower articular surface of the radius looked backward instead of forward, there was an apparent dorsal, instead of volar, subluxation of the hand, and an anterior, instead of a posterior, luxation of the lower end of the ulna; the deformity, which affected both hands, developed within five months in an otherwise healthy girl of twelve years. Author has found only one other such case (Kirmisson) in literature. He considers that there are two forms—the ordinary form, in which the lower articular surface of the radius is turned forward and toward the ulnar side, the ulna displaced backward, and an apparent anterior subluxation of the hand exists, and the rarer form just described. Radiograms and photographs of the case are reproduced.—*David Silver, Pittsburgh.*

**Etiology of Congenital Elevation of the Scapula.** By Teske *Zentralbl. f. Chir.*, No 29, 1908; *Zentralbl. f. chir. u. mech. Orth.*, Oct., 1908.

In a child of eight, right torticollis with elevation of the right scapula was noticed. The scapula was 4 cm. higher than its fellow, extending from the sixth cervical to the fourth dorsal vertebra. Abduction of right arm possible to 110° only, the contact of the scapula with the first rib limiting further elevation. Radiograph shows bilateral cervical rib, malformation of first five ribs and rudimentary vertebra between eighth and ninth dorsal.

The shape and relative size of the scapulæ are not mentioned. Little light is thrown upon the etiology of the elevation which the author maintains is due to congenital maldevelopment.—*Alexander E. Horwitz, St. Louis.*

**The Etiology and Pathological Anatomy of Typical Congenital Club-foot together with Observations on the Etiology of other Congenital Malformations.** By Kirchner. *Zeit. für Orth. Chir*, Band XXI, Heft 4, 1908.

1. The normal foot at birth is usually in a position of physiological supination which occurs at the middle of the second fetal month. This supination is brought about by the development of the processus lateralis tali and the sustentaculum tali. 2. At the beginning of the second fetal month the amnion of the embryo is still tensely applied to the embryo. 3. Typical congenital club-foot develops, as a rule, as the result of amniotic narrowing which persists until the end of the fifth or sixth embryonic week. 4. The essential of typical club-foot is not the faulty supinated position but rather the adduction and plantar flexion. 5. Certain typical forms of the tarsal bones do not occur in typical congenital club-foot and the form of the tarsal bones may be very variegated in different cases. 6. The sustentaculum tali is not, as a rule, absent even in extreme cases. 7. The delayed formation of the liquor amnii is due to idiosyncrasy of the embryo. 8. Congenital dislocation of the hip occurs, as a rule, at the same embryonic period as congenital club-foot, and under the influence of persisting amniotic contraction where the lower extremities are placed in an extreme caudal direction. 9. The rarity of deformities of the upper extremities makes it seem unreasonable to explain typical congenital club-foot and luxation of the hip on a basis of embryonic defect. 10. To explain the occurrence of unilateral malformations we can ascribe them on the one hand to different degree of development of the two sides, and on the other hand, to the position

of the yoke sac and the occurrence of small circumscribed intrauterine hemorrhages following a trauma in early pregnancy.—*Henry O. Feiss, Cleveland, O.*

**Congenital Defect of the Clavicles.** By Heinecke. *Zeit. für Orth. Chir.*, Band XXI, Heft 4, 1908.

In the years from 1764 to 1903, twenty-five cases are mentioned in the literature. In a family of twelve there occurred seven cases which the author describes He summarizes the conclusions of his observations as follows: Congenital defect of the clavicle is often a family affection. It occurs in four grades. 1. A congenital marked incurvation; 2, a break in the continuity somewhere near the middle; 3, partial defect of one of the ends, and 4, total defect The affection causes no impairment of the function of the arm and no diminution of strength; on the other hand, in its extreme types, it may bring about ability for unusual movements of the shoulder The affction is to be regarded as a vitium primæ formationis.—*Henry O Feiss, Cleveland, O.*

**Malformations and Heredity.** By Brandenberg. *Zeit. für Orth. Chir.* Band XXI, Heft 1–3, 1908.

Writer discusses malformations in which heredity manifests itself in a strange manner by affecting only one sex or by affecting one sex peculiarly. He refers to ten families that he has studied tracing out the tendency of the deformities with respect to sex. According to his theory, there are four types. In type 1 the transmitted characteristics strike the sex of the deformed genitor (cases 1 and 2). In type 2, they strike the sex of the not-deformed genitor (cases 5, 8 and 9). In type 3, without transmission the deformity has a special tendency toward one of the sexes (cases 3, 4 and 10). Type 4, where in spite of the typical family deformations the deformities do not tend to one sex.—*Henry O. Feiss, Cleveland, O.*

**Congenital Dislocation of the Hip, its Causes, its Mechanics and its Anthropological Significance.** By Damany and Eckstein. *Zeit. für Orth. Chir.*, Band XXI, Heft 1–3, 1908.

Notes on Transformation:

Author's researches have shown that the study of this defect includes a group of problems in comparative and human anatomy, embryology and anthropology. In the human skeleton are portrayed signs of a struggle to maintain a well-formed body on the one hand, and to enlarge its brain volume on the other. This hypertrophy of brain volume brings with it certain dangers, the most noteworthy being that of congenital dislocation of the hip. Starting with the lowest protovertebrates, we note the gradual development of the limbs and the increased capacity of the brain. In the lowest types, there are no legs, then small limbs develop and finally we get lengthening of the femurs. Up to the man-ape the axis of the trunk is parallel with the ground and in these apes it begins to lift itself, but all four limbs are used for locomotion. In man only the hind limbs are used. So the white race is characterized by the upright attitude and increased brain volume. Why has a white man a larger pelvis than the negro? Simply because the white female brings children into the world with larger skulls. The child has gone through three deformations by the time it is born on account of the extreme flexion of the legs. 1. Its pelvis is deformed, owing to the bending of the iliac bones on the sacrum, *i. e.*, there is an enlargement of the sacro-pelvic angle. 2. The acetabulum is flatter than originally. 3. The

femurs are turned from 30 to 40°. Significant as such deformations are they would never result in harmful effects if the human being maintained the attitude and gait of the quadrupeds. The pathologic consequent—namely, congenital dislocation of the hip—is brought about because after the extreme flexion in the uterus, there must follow an extreme deflexion as is necessitated by the adaptation to the erect attitude. The adaptation is only possible at the expense of the following deformations: 1. detorsion of the femur. 2. Incurvation of the lumbar spine which has the same muscular basis as the shifting and curvation of the sacrum, thereby bringing about an increase in the sacro-pelvic angle. 3. The center in which these deformations take place is the hip-joint, a joint that is constructed faultily in the human being, above all in the normal healthy baby.

*The Defect on the Human Hip-joint.*

In the lower animals we find that a median section through the femur forms two right angles with the plane of the acetabular opening, one facing forward and the other backward. In human beings the anterior angle is always greater than the posterior. Here is a great anatomical failure. The causes of this are, first, the anteriorly directed socket, and second, the torsion of the femur. The sum of these two defects is congenital dislocation of the hip. The author therefore bases the mechanism of the deformity on the causes above alluded to, and further confirms his reasons by the pathological findings.

*Fundamental Rule of the Antropological Ascent.*

He states that as congenital dislocation of the hip is a result of a defect in the human hip, a defect which becomes greater in the rising anthropological scale, then we should expect to find it more frequent in the higher than in the lower races, and more frequent in the female than in the male sex. As a matter of fact, this is the case. Pathological influences have little significance in the development of the deformity. Heredity and family disposition are to be noted in about 25 per cent., but the anthropological ascension overweighs all other causes and figures as the chief predisposition. It is evidenced by two facts, the breadth of the pelvis and the length of the femur. In this anthropological scale the white races are on the top, the yellow in the middle and the black at the bottom. In all three races the female is higher than the male. Such an anthropological difference is not the case in other congenital affections, and distinguishes with absolute certainty the etiology of congenital dislocation of the hip.

*Therapeutic Induction.*

Torsion of the upper end of the femur in these cases implies that before removing fixation the bone must be turned so that the neck should look inward.

This article is of extreme interest and the conclusions arrived at seem to be the logical deductions from carefully selected facts.—*Henry O. Feiss, Cleveland, O.*

**Coxa Valga, Congenital. The First Step to Congenital Dislocation of the Hip.** By Preiser. *Zeit. für Orth. Chir.*, band XXI, Heft 1–3, 1908.

Congenital coxa valga consists not merely in a certain obtuseness of the hip but also in a very considerable antiversion of the neck. Luxation results from weight-bearing after the first attempts at standing or walking. The anteverted head gets no hold on the acetabular roof. As the acetabular roof is prevented from developing on account of this pressure it explains why luxation takes place. Earnest measures must be taken to counteract

this pressure of the head. Author discribes three types of position for the acetabulum and shows how an index of its deviations may be arrived at. The question as to whether we should place the hip in inward or outward rotation in the first plaster is only to be answered if we consider the position of the acetabulum as perhaps measured by this index.—*Henry O. Feiss, Cleveland, O.*

**Deformities Following Joint Affections in Sucklings.** By Preiser. *Zeit. für Orth. Chir.*, Band XXI, Heft 1–3, 1908.

Author alludes to Drehman's earlier contribution on this subject referring to sixteen cases and also adds three other cases to the list. The first, pseudo-congenital dislocation of the hip; the second and third, coxa vara. He believes that in cases of coxa vara the line of the epiphysis must be the chief seat of the disease and that the cases with luxation are the result of a primary synovitis.—*Henry O. Feiss, Cleveland, O.*

**Congenital Dislocation of the Hip.** By Thilo. *Zeit. für Orth. Chir.*, Band XXI, Heft 1–3, 1908.

Writer describes a bilateral congenital dislocation of the hip in a twenty year old person who committed suicide. There were several peculiar points, the acetabulum was small and triangular and a compact tendonous sheath was spread over it. This sheath was continued over the head of the femur enclosing it in a tense villous envelope 3 mm. thick. The head after its displacement from the socket had stretched the capsule more and more, and the latter applying itself always more firmly to the hip, finally enclosed it entirely as a firmly fitting envelope, which was only fastened to the pelvis at one place by the compact strands. These strands bore almost entirely the body weight. Further points. Discussion.—*Henry O. Feiss, Cleveland, O.*

**The Significance of Heredity in the Etiology of Congenital Dislocation of the Hip.** By Wollenberg. *Zeit. für Orth. Chir.*, Band XXI, Heft 1–3, 1908.

Although to-day the great majority of authors favor a mechanical theory for the origin of congenital dislocation of the hip, there are yet individual opponents to be found to this theory. The reason for this is the indisputable fact of the frequent transmission of the deformity. Even to-day is the general opinion rife that such deformities which are transmitted from parent to children or through many generations are to be conceived as "endogenous" or "congenital in the narrower sense." The author gives various lists of cases from the literature showing transmission. Of 168 published cases, 124 were hereditary and forty-four showed luxation in the family. A discussion of the various theories of heredity. Author regards the important theories on the etiology of the congenital dislocation of the hip from the point of view of transmission. As the majority of modern authors favor mechanical theories for the etiology, we have to consider the question how a mechanical conception fits in with a transmissibility. Of extrinsic causes which are able to cause mechanical pressure on the fetus we must consider spacial disparaties between the maternal and infant organisms. First, anomalies of the maternal generative organs, such as abnormal pelvis and abnormalities of the uterus, tumor, etc. Second, extrinsic causes which are due to the anomalies of the fetus, and third, anomalies in the embryonic membranes. It would be important evidence if it could be shown that a luxation is transmitted with a diminution of amniotic fluid, thus causing mechanical pressure. Such evidence is of course difficult to furnish. The adherents of the mechani-

cal theories cannot but regard at least such cases of luxation as occur hereditarily as due to intrinsic causes derived from defect in the embryo, they must, therefore, admit the possibility of transmission of acquired characteristics and a varifold and not uniform etiology.—*Henry O. Feiss, Cleveland, O.*

## IX. TRAUMATIC LESIONS. FRACTURES AND DISLOCATIONS. SPRAINS.

Excision of the Os Innominatum. Arthrodesis of the Sacro-iliac Synchondrosis. C. F. Painter. Boston Med. and Surg. Journal, August 13, 1908.

Obscure Fractures Discovered by Roentgen Examination. S. Lange. Abstracted in Journal A. M. A., August 29, 1908, p. 790.

New Apparatus for the Treatment of Fracture of the Patella. A. I. Lawbaugh. Abstracted in Journal A. M. A., August 29, 1908, p. 792.

An Unusual Fracture of the Clavicle. J. W. Rob. Lancet, London, August 1, 1908.

Dorsal Luxation of the Great Carpal Bone. P. Bull. Norsk Magazin for Lægevidenskaben, August, 1908, LXIX, No. 8.

Recovery in Case of Multiple Fractures of the Pelvis and Femur with Extensive Trauma of One Kidney and Impaction of Pubic Arch in the Bladder. J. F. Menestrina. Abstracted in Journal A. M. A., Sept. 12, 1908, p. 948.

Fracture of the Patella. M. Figueira. Long Island Med. Jour., July, 1908.

Operative Treatment of Fractures and Their Consequences. S. Peltesohn. Abstracted in Journal A. M. A., Sept. 19, 1908, p. 1040.

Method of Treating Fracture of the Femur in the Newly Born. J. Edmondson. Abstracted in Journal A. M. A., August 22, 1908, p. 711.

Wire Suture of Fractured Clavicle. A. Cianni. Gazzetta degli Ospedali e delle Cliniche, Milan, July 12, 1908, XXIC, No. 83.

True Fractures of Neck of Femur in the Young. O. Haldenwang. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1115.

Isolated Fracture of the Tarsal Scaphoid. O. Hoffmann. Beiträge zur klin. Chir., July, 1908, LIX, No. 1.

The X-ray and Fractures. F. L. Cotton. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1105.

Injuries in Ankle Region, Especially of Scaphoid Bone. H. Finsterer. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1115.

Extension Treatment of Fractures of the Shaft of Long Bones. G. Montandon. Abstracted in Journal A. M. A., October 3, 1908, p. 1191.

Screw Apparatus to Promote Healing of Fractured Patella. Bettmann. Abstracted in Journal A. M. A., October 17, 1908, p. 1382.

Fracture of the Neck of the Femur. Royal Whitman. Meeting of the N. Y. Surgical Society, April 8, 1908; Reported in Annals of Surgery, Sept., 1908, p. 447.

A Case of Extension Dislocation of the Atlo-axoid Articulation. A. Wittek. Münchener med. Woch., No. 35, September 1, 1908.

Fracture of the Neck of the Radius. A. Appleton Nutter. Montreal Med. Jour., October, 1908, p. 728.

Backward Dislocation of the Elbow; Ulnar Paralysis. F. Kammerer. Meeting of the N. Y. Surgical Society, May 13, 1908; Reported in Annals of Surgery, October, 1908, p. 621.

Reduction of Supracondyloid Fracture of Humerus. W. C. Lusk. Annals of Surgery, September, 1908, p. 432.

Nailing of the Lower Epiphysis of the Radius. H. A. Haubold. Journal A. M. A., October 17, 1908, p. 1329.

Chauffeur's Fracture. Sir G. T. Beatson. Abstracted in Journal A. M. A., October 17, 1908, p. 1379.

Direct and Internal Splintage by Operation in Fractures of the Forearm Bones. E. M. Corner. Abstracted in Journal A. M. A., October 17, 1908, p. 1379.

Volar Dislocation of the Ulna Complicated with Typical Fracture of the Radius, with Ulnar Paralysis. Ihon. Münchener med. Woch., No. 29, July 21, 1908.

Old Fracture of Patella; Lengthening of Quadriceps. John A. Hartwell. Meet-

ing of N. Y. Surgical Society, April 22, 1908; Reported in Annals of Surgery, September, 1908, p. 455.

Operative Treatment of Recent Fractures of the Femoral Shaft. T. W. Huntington. Abstracted in Journal A. M. A., October 17, 1908, p. 1373.

Indirect Fractures of Metatarsus. A. Nast-Kolb. Abstracted in Journal A. M. A., October 10, 1908, p. 1290.

Fracture of Lower Epiphysis of Tibia. Frederic S. Coolidge. Boston Med. and Surg. Jour., October 8, 1908, p. 470.

Volkmann's Ischemic Paralysis. George D. Stewart. Meeting of N. Y. Surg. Society, May 13, 1908; Reported in Annals of Surgery, October, 1908, p. 606.

Avulsion of the Bicipital Tuberosity of the Radius. A. L. Hall. Abstracted in Journal A. M. A., Nov. 7, 1908, p. 1641.

Fracture of the Metacarpal Bones. J. A. MacKenzie. Abstracted in Boston Med. and Surg. Jour., Dec. 3, 1908, p. 775.

A Case of Traumatic Kyphos. Georges Guillain and Laroche. Abstracted in Zentralblatt f. chir. u. mech. Orth., Oct., 1908, p. 478.

Two Case of Dislocation of Metatarsophalangeal Joint. F. Wette. Münch. med. W ch., Sept. 15, 1908, LV, No. 37.

Obscure Fractures Discovered by X-Ray Examination. S. Lange. Lancet-Clinic, October 3, 1908.

Treatment of Fractures and Depressed Deformities of the Nose by Means of a New Method with the Use of a Combined Bridge and Intranassl Splints. W. W. Carter. Laryngoscope, September, 1908.

Treatment of Fractures by Means of Mobilization and Massage. J. Lucas-Championnière. Abstracted in Journal A. M. A., October 31, 1908, p. 1554.

Fractured Femur in an Infant. J. J. Purdy. Old Dominion Jour., of Med. and Surg., Sept., 1908.

Fracture of the Neck of the Radius. J. A. Nutter. Montreal Med. Jour., October, 1908.

Treatment of Fractures and Dislocations. C. Ewald. Abstracted in Journal A. M. A., Nov. 7, 1908, p. 1650.

Fracture and Refracture of the Patella, with Treatment. E. M. Corner. Abstracted in Journal A. M. A., Nov. 14, 1908, p. 1736.

Necessity for End-to-end Apposition in Fractures of Long Bone. H. T. Gray. Abstracted in Journal A. M. A., Nov. 14, 1908, p. 1737.

Total Luxation of Metatarsus in Lisfranc's Joint. E. D. Schumacher. Beitr. z. klin. Chir., September, 1908, LIX, No. 3.

Dislocation and Fracture of Astragalus. Howard A. Lothrop. Clinical Meeting of Staff of Boston City Hospital; Reported in Boston Med. and Surg. Jour., Nov. 12, 1908, p. 648.

**Fractures of the Lower Extremity of the Humerus. Surgical Treatment.** By Huchet, Paris. *La médecine des accidents du travail.* Vol. V, p. 136. Abstr. *Centralblatt fuer chir. und mech. Orth.,* July 1908, by Ottendorf.

H. quotes several French surgeons who advise in fractures of the joints, especially of the elbow, that no fixed dressings be used. While some prefer massage and mechanotherapy, others advise operations. He then describes in detail Lambotte's method of fixing the fragments by screws. In oblique fractures and in tearing off one or both condyles the fragments may be fixed directly by screws; in transverse fractures union may be obtained by fixing a longitudinal iron band on the fragments. Besides the replacement and fixation of the fragments any necessary operation for loosening of a pressed nerve or other soft tissues may be done at the same time.

The reviewer cannot agree with this point of view, especially in children, because in most cases it will be possible to optain good results after a short fixation to be followed by mechanotherapy. When it is possible to treat the patients in hospitals, Bardenheuer's traction method seems to the reviewer

a most excellent way to successfully treat joint fractures without operation. Operation should be reserved for occasional cases, but not employed as a routine.—*H. Bucholz, Boston.*

**Total Excision of the Wrist After Injuries.** By Vallas. *Societé de chirurgie de Paris*, Jan. 29, 1908. *Revue de Chirurgie*, 1908, 3, p. 387. Abstr. *Zentralblatt fuer chir. und mech. Orth.*, by Ewald.

Vallas approves of total excision of the wrist after injuries, when normal conditions cannot be obtained or ankylosis has occurred. In old cases total excision should always be made, because partial excision of the carpal bone, f. i. the fractured (carpal) scaphoid or the dislocated semilunar bone will lead to failure. With total excision, however, he obtained complete results in power and mobility.

In the discussion Routier, Delbet, and Chaput, with whom the reviewer agrees, express the contrary opinion. In fractures of the scaphoid and dislocations of the semilunar bone they have obtained good results with simple excision of the bone. Lucas-Championnière has had splendid results with total excision of the wrist in cases of complete ankylosis.—*H. Bucholz, Boston.*

**Vertebral Deformations Following Trauma.** By Duclaux, Paris. *La médecine des accidents du travail*, V, p. 151. Abstracted in *Zentralblatt fuer chir. und mech. Orthop.*, July, 1908, by Ottendorf.

In connection with the case of a 6-year-old girl Duclaux enumerates the various theories concerning the origin of Kuemmel's disease, and discusses the differential diagnosis. Besides osteomyelitis, syphilis, typhoid, and similar diseases, hysteria and Pott's disease must be cautiously excluded. Angular kyphosis which will not vanish in suspension excludes hysteria. Distinction from tuberculous gibbus is often very difficult. The previous history and lack of other tubercular affections must be considered. (Cutaneous tubercular test should be employed. Ref.) Furthermore, the X-ray picture may decide the diagnosis.

Treatment: Three months immobilization in bed, later for a long period a rigid corset to be worn. The reviewer would recommend such a corset with support for the head, because a corset for the body alone does not seem sufficient to prevent the increase of the knuckle.—*H. Bucholz, Boston.*

**Fracture of the Carpal Scaphoid.** By Peltesohn. *Muench. med. Wochenschrift*, 1908. Nr. 2, p. 98.

Colle's fracture, produced by turning the crank on an automobile, is a typical injury of chauffeurs. P. has treated a chauffeur, who received a fracture of the carpal scaphoid by the same mechanism.

In the discussion Muehsam mentions a shoulder dislocation produced in the same way.—*H. Bucholz, Boston.*

**Contribution to the Operative Treatment of Old Fractures of the Patella.** By O. Hanasiewicz. *Wiener med. Wochenschrift*, 1908. Nr. 9.

H. reports a case of a thirty-two year old man, who had had a fracture of the patalla three months previously, without any treatment. The separation was about two fingers broad. H. excised the scar tissues between the fragments and sewed the fragments with wire of aluminium bronze without bringing the wire in contact with the cartilage of the patella. Union was obtained only with a small separation of about one-eighth of an inch. No plastic operation was possible on account of external circumstances.

Then he sewed the capsule with silk and stitched one thick silk thread between the quadriceps and patella tendon. A plaster-of-Paris cast was applied for three weeks, but in twelve days after the operation active and passive movements and massage were employed and the patient was able to walk well four weeks after the operation, without any dressing. In conclusion H. mentions other methods and recommends operative treatment as the best in such cases. The reviewer considers the early motions in these cases important in obtaining such a good result as that reported above.—*H. Bucholz, Boston.*

**Traumatic Coxa Vara.** By Heinsius. *Deutsche med. Wochenschrift*, 1908. Nr. 15, p. 673.

H. presents a seventeen year old boy, who fell down in jumping over a trench, five months ago. He had pain in the right hip, but was able to walk home and to do his work for three months. Then he began to limp and was obliged to lie down on account of increasing pain in the hip. The examination showed all symptoms of coxa vara. In the X-ray picture the epiphysis of the head of the femur was seen broken off and displaced toward the trochanter minor. The same condition was seen at the operation (excision of the broken piece). H. emphasizes that in the histories of coxa vara the slow gradually progressing development following a slight trauma is a typical fact, and that most cases have a traumatic origin (loosening of the epiphysis). In the discussion Thoele and Storp believe that coxa vara should be separated from the traumatic loosening of the epiphysis.—*H. Bucholz, Boston.*

**Muscular Plastic in Old Fractures of the Patella.** By Wrede. *Deutsche med. Wochenschrift*, 1908. Nr. 23, p. 1037.

W. presents the case of a thirty-nine year old farmer, who had had a transverse fracture of the patella ten months before. The fragments showed a separation of 8 cm. The extensor muscles were extremely atrophic, the patient was not able to straighten out or to bend his leg fully. Lexer operated (upon the case) in the following manner: He made a long, tongue-like flap out of the middle of the quadriceps with the base at the upper border of the patella; he then turned over this muscular, tendinous flap and fixed it, pulling it down with wire and silk in a trough, made for this purpose on the anterior surface of the lower fragment. Plaster-of-Paris cast. Four months after the operation the patient was able to lift his leg in extension, to walk without any trouble and to bend his knee to an angle of less than 90°. *H. Bucholz, Boston.*

**The Operative Treatment of Fractures of the Neck of the Femur in Adults.** By Carleton P. Flint, M. D., New York. *Annals of Surgery*, November, 1908.

Operative intervention is indicated where there is, or is likely to be, nonunion, excepting when the general condition of the patient influences the prognosis unfavorably. Impacted fractures are to be operated upon only in young persons, and when the impaction will greatly diminish the usefulness of the leg. Impacted fractures in old persons are not suitable for open operation nor should they be broken up to gain abduction. A non-impacted fracture in a young robust adult should not be operated upon or spiked, abduction maintained by plaster being indicated: if there is no union in two and one-half months, operation is indicated. If the patient be aged but still in good general health, the head fragment should be excised within a few days after the injury.

Reason for the above statements are given in detail, as are the indications for and against operation in individual cases. A method of exploring the neck of the femur is given and illustrated by photographs.—*R. R. Fitch, M. D., Rochester, N. Y.*

**Arthroplasty for Complete Ankylosis of the Elbow. Result one Year and a Half after Operation.** By Charles M Scudder, M. Y., Boston, Mass. *Annals of Surgery*, November, 1908.

Ankylosis followed T-fracture of the elbow-joint. Result of arthroplasty was motion from full flexion to within thirty degrees of full extension. Forcible extention was gained, a great improvement over the usual flail elbow.—*R. R. Fitch, Rochester, N. Y.*

**The Modern Treatment of Fractures by Means of Direct Internal Splintage.** By E. M. Corner. *International Clinics.* Vol. III, Series XVIII.

Under this title author discusses the operative treatment of fractures, applying the term "internal splints" to the silver wire, silk, plates, screws, etc., used in maintaining apposition. He treats of the subject generally and reports a number of cases but does not present any new facts of especial importance.—*David Silver, Pittsburgh.*

**Fractures of the Os Calcis.** By F. J. Cotton. *Boston Med. and Surg. Jour.* October 29, 1908.

A paper of much importance, strongly advocating active interference in these cases.

Comminuted fracture of the os calcis is relatively common, and nearly all cases are of substantially the same type. Probably fifty per cent. of all cases suffer considerable permanent disability, due to one or more of the following causes;

1. Raising of the heel.
2. Shortening of the heel.
3. Outward deviation of the heel.
4. Flattening of the arch.
5. Projection of fragments into the sole of the foot.
5. Projection of fragments into the sole of the foot.
6. Loss of motion between astragalus and os calcis.
7. Mechanical interference between os calcis and external malleolus.

The best diagnostic point is bony thickening below the external malleolus. This sign is practically never absent.

Expectant treatment almost universally gives bad results. Early interference is strongly advised. Under an anesthetic the displacement must be corrected. Wrenches are of little assistance. If sufficient grip cannot be obtained by the hands alone, a steel sound is passed through the heel just in front of the tendo Achilles, in contact with the upper surface of the os calcis. Tenotomy of the tendo Achilles is unnecessary.

Reimpaction is easy if the inner side of the foot be laid on a sand-bag and the outer surface of the heel be struck with a heavy mallet, the tissues being protected by a thick felt pad. Next, the foot must be forcibly pronated and supinated until these motions are free. A cast padded over heel and dorsum of foot with felt, is applied, to be removed occasionally for massage after ten days. Weight-bearing is not allowed for a month.

Old cases with bony spurs in the sole, or with thickening under the external malleolus can be treated by operative removal of these bony masses, with excellent results.—*E. W. Ryerson, Chicago.*

**Reduction of Supracondyloid Fracture of the Humerus.** By Wm. C. Luck, M. D., New York, *Annals of Surgery*, September, 1908.

The author advises preliminary hyperextension of the elbow as a means of "unlocking the fragments and placing them in a position favorable to reduction." Reduction is then accomplished by downward traction and flexion. Extreme flexion is advocated in this position, the coronoid process bears directly against the upper fragment which is necessary for the manitenance of complete reduction. Report of cases illustrated by X-ray negatives.

**Recurrent Dislocation of the Ulnar Nerve.** By Farrar Cobb, M. D., Boston, Mass. *Annals of Surgery*, September, 1908.

A detailed report of the author's second case, also abstracts of cases reported since the author's first paper, and a complete bibliography. The author concludes that operation is indicated in cases of complete dislocation of the nerve-producing symptoms. The nerve should be replaced in its groove and covered in by a flap of fibrous tissue from the triceps fascia.—*R. R. Fitch, Rochester, N. Y.*

**The Conservative Treatment of Fractures of the Femur.** By Astley. Paston Cooper Ashhurst, M. D., and Wm. A. Newell, M. D., of Philadelphia *Annals of Surgery*, November, 1908.

A statistical paper recording 121 cases of fracture of the femur treated by nonoperative methods. The authors state that the results of such treatment have been satisfactory in all but the cases of fracture of the neck of the femur, and they doubt whether operative treatment of these latter cases would have been any more beneficial.—*R. R. Fitch, M. D., Rochester, N. Y.*

**Bursitis Subacromialis, or Periarthritis of the Shoulder-joint.** (**Subdeltoid Bursitis**).—By E. A. Codman, *Boston Med. and Surg. Jour.*, October 22, 1098, to December 4, 1908, inclusive.

An excellent and exhaustive paper upon this important subject. This affection is more common than all the other lesions of the shoulder-joint combined. The subdeltoid and the subacromial bursa are one and the same thing. Usually at least two and one-half inches in diameter, and extends well under the acromion.

The cases are classified as follows:

1. Acute, or spasmodic type.
2. Subacute, or adherent type.
3. Chronic, or nonadherent type.

The symptoms of these types are given in detail, and cannot be abstracted satisfactorily. The prognosis is, in general, good; type 2, the most serious, tending to spontaneous recovery inside of two years.

In the treatment of type 1, rest is important, and can best be obtained by keeping the arm in an abducted position, as by seating the patient beside a table with the abducted arm laid on a pillow upon the table. At night the arm may be placed on a pillow laid on the bed at right angles to the body. When walking, a sling may be used with caution, and the arm should occasionally be lowered and swung by the side.

In type 2, operation seems to offer better and quicker results than the forcible breaking up of adhesions. The bursa is opened, the adhesions cut or torn, the skin is united without suture of muscle or bursa, and no drainage is used.

Cases of type 3, due to irregularity in the surface of the bursa, can be

operated if there is sufficient pain and disability to warrant the procedure Massage is the most efficient alternative.

Many cases which pass under the diagnoses of contusion of the shoulder, neuritis, periarthritis, circumflex paralysis, and muscular rheumatism are really due to subacromial bursitis.—*E. W. Ryerson, Chicago.*

**Backward Dislocation of the Elbow; Ulnar Paralysis.** By F. Kammerer, M. D. *Annals of Surgery*, October, 1908.

Attempts at manipulative reduction had failed. Reduction by operation through posterior longitudinal incision. On day following operation paralysis of ulnar nerve was noticed. This paralysis became complete in a few days. After three weeks, on removal of plaster-of-Paris dressing, dislocation was found to have recurred. At second operation a nail was driven through the olecranon into the humerus. The nail was left in position for two weeks. Passive motions were begun at the end of four weeks, and a good range of motion was obtained. Five months after injury there was no improvement in the paralysis. A-six inch incision was made over the ulnar nerve, which was thoroughly explored, but the cause of paralysis was not found. The paralyzed muscles however began to resume their functions in a few weeks and progressed to almost complete recovery.—*R. R. Fitch, Rochester, N. Y.*

**Fracture of the Eminentia Capitata.** By Carlton P. Flint, M. D., New York. *Surgery, Gynecology and Obstetrics*, September, 1908.

The author describes in detail a fracture of this kind in one of his own cases and then reviews very carefully the literature on that subject.

He divides the reported cases into two groups, and discusses their differences

The main point gained from the paper is that all of the cases require operation for the relief of the condition, and that with operation the results are good.—*Edward S. Hatch, New Orleans.*

**The Pathogenesis of Ganglia.** By William C. Clarke, M. D., New York. *Surgery. Gynecology and Obstetrics*, July, 1908.

The Author gives a very exhaustive description of the different theories in regard to the formation of ganglia.

He also reviews the embryology of joints.

It would be impossible here to give any idea of the amount and value of the work presented in this paper; the conclusions reached by the author are as follows:

A ganglia may be caused by a hernial protrusion of synovial membrane, but such a condition would be very rare.

Many ganglia are distended anatomical or adventitious bursæ, but most ganglia are connective-tissue cysts formed by degeneration.—*Edward S. Hatch.*

**A practical Suggestion in the Reduction of Dorsal Dislocation of the Hip.** By John Hunt Shepard, M. D., Coeur d'Alene Idaho. *Surgery Gyn. and Obstetrics*, September, 1908.

The writer describes a case of dorsal dislocation of the right hip in which he was unable to effect a reduction by the method of Bigelow.

He used the following method with perfect success.

Patient lying on his back on the floor anesthetized, one man kneeling by the patient's left side facing his feet with one hand on each iliac crest, fixing the pelvis.

Operator kneeling on his left knee at right angles to the patient at the level of the pelvis on the patient's right side.

Left hand on patient's right knee, right hand on his ankle, his thigh flexed at a right angle to his body, and his leg at a little more than a right angle to his thigh.

The middle of the operator's right thigh was then placed under the flexed knee of the patient.

From this position the reduction was easily made.

The writer feels that this method possesses the following advantages:

I. The ease with which one can exert steady traction and to almost any amount for it is accomplished by the powerful quadriceps extensor, assisted by all of the muscles used in rising from the kneeling position.

II. The hands of the operator are free to manipulate the leg in any direction and by so doing can search for the rent in the capsule.

III. Reduction is accomplished without using any structure as a fulcrum, but by simply hunting for the way of escape that the head took at the time of the accident and then reversing the forces that produced it.

Then one does not increase during reduction the damage already inflicted upon the tissues surrounding the joint.—*Edward S. Hatch, New Orleans.*

**Fracture with Fibrous Union. Treated by Induced Pin Callous.** By Wm. M. Perkins. *New Orleans Med. and Surg. Jour.*

Dr. Perkins reports one case of ununited fracture of the humerus two years in duration which he treated by drilling holes through the fibrous tissue between the ends of the bones. He passed the drill holes through the fibrous tissue into the solid bone in many directions hoping to have these holes fill with blood-clot and later become ossified. In the case reported firm bony union was obtained in seven weeks.—*A. H. Crosbie, Boston.*

**Some Points on the Treatment of Fractures.** By J. G. Sheldon. *Journal of the Kansas Medical Society,* July, 1908.

It is of the utmost importance in the treatment of fractures to consider the position of important muscles and the deformities which they may produce. From this point the author makes a short abstract in two pages of what is already well established in the treatment of fractures; covering Colle's fracture, fractures of the forearm, fractures of the neck of the femur and Pott's fracture. He calls attention to the method of Pilcher for reducing Colle's fracture, which consists of preserving the fibrous and periosteal bridge on the dorsal side. He believes that fracture of the femoral neck is best treated by the method of Maxwell.

**A Rare Injury to the Spinal Column.** By J. van Assen. *Zeit. für Orth. Chir.,* Band XXI, Heft 1–3, 1908.

The injury was a fall upon the head. The chief physical sign is the stiffness of the head. The lesion as proven by the Roentgen picture was a breaking off of a piece of the atlas with a fracture as well of the anterior arch of the same bone. The symptoms point to no injury to the cord. The rarity of the lesion is evidenced by the scarcity of the literature which is carefully reviewed.—*Henry O. Feiss. Cleveland, O.*

## X. APPARATUS AND X-RAY.

Is Radiography in Colors Possible? J. Rudis-Jicinsky. Abstracted in Journal A. M. A., October 17, 1908, p. 1377.

**Mechanical Treatment of Diseases of the Circulatory System, with Special Consideration of Zander Methods.** By C. H. Bucholz, *Boston Med. and Surg. Jour.*, Oct. 1, 1908.

Mechanotherapy is especially useful in cardiac cases where affections of the peripheral circulatory organs are prominent features. Also, many cases of valvular defects, diseases of the cardiac muscle, and others (sic) are favorably influenced.

The methods of Ling, and those of Schott, resistance gymnastics, may be used where Zander treatment is contraindicated.

Some of the Zander exercises are partially described, and the theories of their beneficial action are interpreted in a general way.—*E. W. Ryerson, Chicago.*

**The Use of Plaster of Paris in Surgery.** By W. E. Blodgett. *Detroit Med. Jour.*, July, 1908.

Clear and simple directions for the preparation and application of plaster-of-Paris dressings. Intended especially for the general surgeon and practitioner. Contains no new material.—*E. W. Ryerson, Chicago.*

**Roentgen Diagnosis of Syphilis of the Bones.** By Dr. G. Fedor Hæniech of Hamburg.

Hahn, Kiebock and Kohlen have studied the Roentgen plates of clinically diagnosed cases and established certain names for the expression of various processes and luetic alterations of the skeleton in Roentgen pictures. It is now possible to determine in many cases the kind and extent of affections from Roentgen pictures. The least ambiguous and clearest findings appear to be the periosteal "gumma" especially in long bones. Affections of a gummatous nature arising from bone or marrow, show much that is typical and characteristic in Roentgen plates. Roentgenological proof of luetic alterations in joints and many short bones is still far from clear.

Nevertheless, with aid of histories and clinical examination, we can diagnose a periostitis, an ostitis or osteomyelitis, simplex or gummatous. In many cases even, as before said, the Roentgen-ray offers so many pronounced characteristics that diagnosis may be determined from the plate alone in contradiction to history. In other cases the Roentgen ray points at least to the possibility of a luetic process and so leads in the right direction. Cases sent for examination to the institute are diagnosed as syphilis from the Roentgen plate alone, even where there has been no suspicion of luetic disease. The diagnosis has been confirmed later by the history.

The usual condition of the bone as shown by the Roentgen-ray is as follows:

Considerable corticle thickening and irregularity in bony outline. Periosteum considerably thickened and in some places the normal cortical outline may be seen beneath it. There is never any bony atrophy. The process is usually a merging of marrow and corticle substances so that they cannot be differentiated. The characteristic circular periostitis of the luetic infection is well worth noting. The process may extend along the whole shaft, but may make a localized pyriform tumor.—*A. B. George, Boston.*

**A Lumbar Swing, a New Scoliosis Pendulum Apparatus.** By Becker. *Zeit. für Orth. Chir.*, Band XXI, Heft 4, 1908.

Description of an apparatus to carry out the function of swinging the lumbar spine. The advantages of this apparatus are the extreme redresse-

ment of the lumbar deviation, the exact localization of the bending at the apex of deviation, the effective active practice of lumbar musculature and the ability to keep the accessory leg muscles from taking part.—*Henry O. Feiss, Cleveland, O.*

**Treatment of Deformities by Plaster-of-Paris and Other Mechanical Devices.** By H. W. Orr. *Western Medical Review,* Omaha, September, 1908.

The author points out that braces have been used for the correction of deformities since the early experience of Hippocrates. He believes that at the present day braces should be used after deformities are corrected by proper surgical measures. The time has come for both the entire profession and the laity to realize the field of the open operation as a preliminary procedure to the use of plaster or mechanical appliances. It is important to bear in mind that the so-called "bloodless" operation is often attended with more damage than a properly executed cutting operation.

## XI. MISCELLANEOUS DISEASES. GENERAL ORTHOPEDIC ARTICLES. PHYSICAL THERAPY, ETC., ETC.

Two Cases of Raynaud's Disease. T. D Woodson. Medical Fortnightly, August 25, 1908.

Case of Raynaud's Disease. J. Kolmer. Abstracted in Journal A. M. A., October 31, 1908, p. 1552.

Intermittent Limping in Arms and Legs. H. Kronenberg. Abstracted in Journal A. M. A., Nov. 14, 1908, p. 1741.

Resection of Hip-joint with Interposition of Flap of Muscle. Ahrens. Münchener med. Woch., October 13, 1908, LV, No. 41.

Transplantation of Periosteum in Bony Ankyloses of Joint. E. M. Hofmann. Abstracted in Journal A. M. A., Nov. 21, 1908, p. 1822.

Plastic Operations on Bones. A. Barth. Abstracted in Journal A. M. A., September 19, 1908, p. 1040.

Free Bone Plastic Operations and Attempts at Transplantation of Joints and Stiffening Joints. E. Lexer. Abstracted in Journal A. M. A., Sept. 19, 1908, p. 1040. Vide also Horwitz's Abstracts in this number.

Sacro iliac Disease. C. R. Andrews and M. Hoke. Abstracted in Journal A. M. A., Sept. 26, 1908, p. 1108.

Therapeutic Application of Dry Hot Air. E. C. Corson. Journal Medical Society of New Jersey, September, 1908.

Chronologic and Anatomic Age in Early Life. T. M. Rotch. Journal A. M. A., October 10, 1908, p. 1197.

A Case of Fibromatous Thickening of the Achilles Tendon. Schwarz. Münchener med. Woch., June 9, 1908, No. 23.

A New Sign for the Detection of Malingering and Functional Paresis of the Lower Extremities. Philip Zenner. Abstracted in Boston Med. and Surg. Jour., Oct. 1, 1908, p. 453.

**The Treatment of Dupuytren's Contracture.** By Schwalbach. *Deutsche med. Wochenschrift,* 1908, p. 988.

Schwalbach reports a case of a sixty-one year old locksmith, who had been treated with fibrolysin for Dupuytren's contracture of several fingers of each hand. Photographs show the splendid result, which is now persistent for fifteen months, without recurrence. The patient refused any operation. Baths in hot soap water and attempts to straighten out the fingers were made in vain. Then injections of 2.2 cm. fibrolysin (Merk-Darmstadt) had been given into the scar tissues, seven in the right hand and two in the left. The

success was complete in five weeks, in spite of the long duration for eighteen years.

Schwalbach has also treated with thiosinamin and later with fibrolysin cases of contracting scars after burns or operations, and strictures of the esophagus. In arthritic contractures he has not seen any satisfactory results. This experience is in accordance with the results of the thiosinamin injections made in the surgical clinic in Breslau by the reviewer and others, although in some cases of arthritic contractures we have seen slight improvement when we were able to inject the fluid directly into the contracted tissues, as for instance into the articulations of the jaw.—*H. Bucholz, Boston.*

**The Treatment of the Muscular Pseudohypertrophy.** By F. Baehr, Hannover. *Zentralblatt fuer chir. und mech. Orth.*, August, 1908.

Baehr has treated a boy of eight years with characteristic symptoms—pseudohypertrophy of the calves, extreme atrophy of the extensor muscles of the thighs and several muscles of the body and shoulders. Slight gymnastic exercises and massage for these atrophic muscles only were employed, with remarkable result. The boy became stronger, the walking was not any more waddling. Climbing a staircase became easier. The volume and consistence of the atrophic muscles were increased.—*H. Bucholz, Boston.*

**Some Surgical Conditions in the Knee-joint.** By Benjamin Tenney, M. D. Boston, Mass. *Annals of Surgery*, November, 1908.

The author's conclusions are as follows: 1. Asepsis and drainage are more essential in knee-joint work than in laparotomies, because of the difference in the skin of the operative fields and in the natural drainage of the two cavities. 2. Sepsis and immobility mean ankylosis. Drainage and mobility may leave some motion. 3. There is an increasing tendency toward operative repair of patella fractures, and an increasing use of absorbable material. This should be the rule to which exceptions may sometimes occus. 4. By far the most common mechanical cause of trouble within the joint is the tab from the infrapatellar pad. This may be a part of a general obesity, in which case the usual anti-fat treatments are appropriate. If it be found in a vigorous and otherwise normal person, it should be removed. Some temporary relief may be obtained by properly applied adhesive straps, but a cure only by removal. 5. Prepatellar bursitis can be cured by incision and drainage. Other bursæ should be dissected and removed. 6. Ligamentous injuries must be carefully treated, and some must have operative repair to prevent recurring or constant disability. No apparatus is so good as a normal knee.—*R. R. Fitch.*

**Writer's Cramp: What it is, and how it can be Treated by the Family Physician.** By S. H. Monell, M. D., New York, *Medical Record*, January 18, 1908.

Writer's cramp is a chronic fatigue. There are two main indications for treatment. "The elimination of the toxic products which result from high pressure muscular work, and part of which gradually stagnate in the tissues, and improvement of the nutrition of the affected tissues so that the powers of recuperation are renewed."

The author relies much upon electrotherapeutics, the use of the electric light radiant heat cabinent bath being especially emphasized. A "sedative tonic" action is also indicated.—*R. R. Fitch, Rochester, N. Y.*

**Physiological Action of the Mount Clemens Mineral Baths.** By Richard Leurchuer, M. D., *Medical Record*, Aug. 8, 1908.

The action of the Mount Clemens baths the author attributes to the absorption of the bromine and iodine into the lymphatics directly through the skin, and not through the blood system, and that the lymph acts directly on the disintegrated cells.

A strong argument he urges in favor of direct absorption into the lymph system is that the blood-pressure before and after the bath remain practically the same, and that if there were direct absorption into the blood system there would be a chemical stimulation to the blood, influencing the action of the heart and the consequent pressure in the vascular walls.

The action then of the sulpho-iodo-bromo-salines absorbed from the baths would result from the stimulation to, and the increase in, amount of the lymph, which by its mechanical force, and larger amounts dislodges and washes out the diseased cells from the diseased tissues.—*John Dunlop, Washington, D. C.*

**Deceptive Conditions in the Hip-joint.** By Roland Hammond. *Boston Med. and Surg. Jour.*, Sept. 3, 1908.

Emphasizes the difficulties in diagnosis of abnormal conditions in the hip-joint, and details six cases which illustrate the similarities and differences between tuberculosis, osteomyelitis, fracture, separated epiphysis, and simple sprain, affecting the upper end of the femur. An excellent radiograph of the case of osteomyelitis is appended.—*E. W. Ryerson, Chicago.*

**Operative Treatment of Ankylosed Joints.** By Lexer, Königsberg. *Zeit. f. chir. med. Orth.*, Oct., 1908, p. 476.

All attempts at restoring function to an ankylosed joint by interposing flaps of tissue have hitherto resulted only in flail-joints or pseudoarthroses. In order to obtain a normal movable joint Lexer attempted, after resecting a knee-joint ankylosed at right angles, the transplantation of the entire knee-joint apparatus from a freshly amputated limb. Complete union resulted. In order to improve active motion, which remained weak, a muscle-plastic was practised.

In other cases, where it was necessary to remove large portions of the tibia and humerus, including the epiphyses, good results were obtained by transplanting freshly amputated bone with its periosteum and articular cartilage. The musculature, previously detached, resumed its function, and the mobility of the joints was restored.

He presented an eighteen year old patient in whom he had removed the first phalanx of the fourth finger on account of enchondroma, and replaced it with the first phalanx of the second toe from a freshly amputated foot. The periosteum and both epiphyses were retained.—*Alexander E. Horwitz.*

**Experimental Transplantation of Joints in Animals.** By Wrede, Königsberg. *Deutsche med. Wochscher.*, No. 23, 1908. *Zentralbl. f. Chir. u. Mech. Orth.*, Oct., 1908.

Experiments on three rabbits are reported on whom the knee-joints—both the tibial and femoral ends—were transplanted. The author thinks that the possibility of joint transplantation is thus demonstrated.—*Alexander E. Horwitz.*

**The Treatment of Trophic Nerve Lesions; A Study Based on a Case of Mal-perforans, of Ischemic Paralysis; and of Erythromelalgia.** By Dr. William C. Quimby.

In his paper Dr. Quimby reaches the following conclusions:

a. That the so-called trophic nerve lesions of the skin, bones and joints are due to a break in what we have called, for convenience, the neurovascular mechanism of the part involved.

b. That this break may be situated centrally, or on the neural side, or on the vascular side.

c. Hence, rational treatment of such conditions will be directed toward modification of (a) the blood-supply or (b) the nerve function of the part.

d. For the modification of the blood-supply we have active and passive hyperemia increasing it, and positive pressure by bandaging, pneumatic cabinet or the immersion in mercury, decreasing it.

e. For modification of the nerve function, we have nerve stretching neuralysis and nerve disassociation and electricity.

f. Nerve stretching is probably to be condemned, similar results to be obtained by simple hyperemia.

The case of stretching of the internal popliteal nerve for mal-perforans of the feet that Dr. Quimby reports was not relieved. The case of ischemic paralysis was greatly relieved by freeing the ulnar nerve from callous.—*A. H. Crosbie.*

**Spasmodic Torticollis; Extirpation of the Nerve of Willis (Spinal Accessory).** By Fieschi. *Archivio di Ortopedia*, 1908, p. 101.

Cases of spasmodic torticollis are rare; according to Sangiorgi there was only one case in 4825 orthopedic cases in five years in the Instituo Rizzoli besides ten cases of the fixed type. After alluding to the unfavorable opinions which have been given concerning operation for spasmodic cases he states that the muscles are affected in frequency and intensity as follows: Sternocleidomastoid, trapezius, splenius, elevator of the scapula, superior and inferior oblique of the head, omohyoid.

The author's patient was a woman aged forty years, the disease commenced with her first pregnancy and lasted three years. The torsion was from left to right, the chin was brought to the right shoulder. There occurred thirty to fifty spasms per hour. While in this case other muscles were involved than those supplied by the spinal accessory nerve still four-fifth of the disturbance was due to the sternocleido and trapezius muscles and these at least could be eliminated. As these muscles are partly innervated by branches from the cervical plexus a complete paralysis was not expected.

The author performed the anterior operation of Giordano, extirpating the nerve before it entered the sterno-mastoid muscle.

Conclusions: The exterpation of the spinal accessory nerve is capable of porducing good and permanent results. It does not produce serious paralyses. It can be done in a few minutes without ligating any vessels. The anterior or premastoid incision is preferable. It does not result in a complete cure but does produce a satisfactory result. The operation is preferable to others which aim at a more complete result, which is not certain of being obtained, while the danger and subsequent treatment necessary is much increased. The operation is not intended to entirely suppress the spasm but it will, with a minimum amount of traumatism, restore the patient to a condition which is very satisfactory.—*Gwilym G. Davis, Philadelphia.*

**The Rarity of Rickets and Scoliosis in New Zealand.** By Herz. *Zeit. für Orth. Chir.*, Band XXI, Heft 1–3, 1908.

In four years of pure orthopedic work in an island of 900,000 whites, 600 patients were examined from all quarters of the island. Seven of these had rickets, two women and one man had constitutional scoliosis of the third grade. This is scarcely more than 1 per cent. of rickets and only five-tenths per cent. of scoliosis. This rarity of rachitic deformities and lateral curvatures was very striking in contrast with his experience in Dresden and Berlin. He further examined 475 school children and further verified this percentage. He believes the scarcity both of rickets and of scoliosis is very significant, but more significant than these two facts is the fact that both are rare at the same time in the same place and under similar conditions. He discusses the etiology of scoliosis from this point of view and states that he never could understand how weight-bearing or poor attitude alone could result in the severe changes of scoliosis.—*Henry O. Feiss, Cleveland, O.*

**The Organization for the Care of Cripples.** By Biesalski. *Zeit. für Orth. Chir.*, Band XXI, Heft 1–3, 1908.

This work belongs to orthopedic surgery. The times when the cripple was an unfortunate who could ask for nothing but pity are past. To-day there are countless assured methods of treatment for defects which used to be considered incurable. Author describes the Berlin-Brandenberg institution for the treatment and education of cripples. The plans, the program of the work, the manner of administration, the expenses and the rules are discussed.—*Henry O. Feiss, Cleveland, O.*

**Surgical Importance of Cervical Ribs to the General Practitioner.** By John B. Roberts. *Journal A. M. A.*, October 3, 1908, page 1126.

In this paper R. calls attention to the fact of how little appreciation surgeons and neurologists have had of the importance of the anomalous cervical rib as an etiological factor in vascular and nervous lesions of the neck and upper extremity. He notes several instances where palsy and atrophy of the intrinsic muscles of the hand was attributed by the neurologists to some obscure nerve lesion, whereas it was due to the presence of an unrecognized cervical rib. Other diagnoses made on account of the presence of a cervical rib and the conditions caused by it are writer's cramp, rheumatism, neuralgia, muscular atrophy, aneurysm, etc.

The diagnosis is easily made by the X-ray and may in some casees be made by palpation. The condition creates a fulness in the neck and in cases where the condition is bilateral gives the neck the appearance of being shortened and thickened. The various forms of the deformity are described. The treatment is surgical only, however, when pressure symptoms are present.—*J. W. Server.*

## BOOK REVIEWS:

Orthopedic Surgery: The Spine. By T. Tunstall Taylor. Williams and Wilkins Co., Baltimore, 1907. 241 pages. 114 original illustrations.

This is the first volume of a work on orthopedic surgery, intended primarily as a text-book for the author's own undergraduate students. No attempt has been made to write an exhaustive treatise but those methods only, as a rule, have been described, which have proved useful to the author. While not adapted, therefore, for general reference, the volume will be found

of especial value to those interested in this branch of surgery, on account of the author's well-known ability in the treatment of spinal ailments.

The first part of the book comprises a short history of the development of orthopedic surgery, a description of surgical supplies, instruments, etc., a chapter on X-ray apparatus and technic, and one on the pathogenesis of deformity.

About 80 pages are given to tubercular diseases of the spine. As might be expected from the author's experience, the principle of hyperextension of the diseased portion of the spine is clearly and concisely stated, and the various methods for obtaining hyperextension described and illustrated. Author's modification of the Dollinger brace possesses several obvious advantages over the ordinary form of spinal support, and merits widespread use. Vaccines and the opsonic index receive appropriate attention. A more detailed description of the general treatment would, in the opinion of the reviewer, be an advantage, even in a work of this character.

The nontubercular conditions, with the exception of postural defects, are necessarily treated in a brief manner. Under anterior-posterior curvatures the various exercises are well illustrated; the addition of the throat band to the light spinal brace, recommended for some of the cases, seems advantageous. Lateral curvature receives more extended consideration and in an excellent manner; among other things the description of the method for obtaining the corrected plaster-of-Paris model for making the corset or brace will be found useful.

As a whole the author has carried out his purpose admirably, and the book is, in addition, a very pleasing example of the book-maker's art.—*David Silver, Pittsburgh.*